



GOVERNMENT OF INDIA
TARIFF COMMISSION

R E P O R T
ON
The Continuance of Protection
TO THE
Power and Distribution Transformers
Industry

BOMBAY
1965

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Report ~~on the~~ continuance of protection to the
Power & Distribution Transformers Industry-
1965.



सत्यमेव जयते

PERSONNEL OF THE COMMISSION



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SHRI PRAMOD SINGH

GOVERNMENT OF INDIA
MINISTRY OF COMMERCE

New Delhi, the 19th November, 1965.

RESOLUTION

Tariffs

No. 5(2)-Tar/65.—The Tariff Commission has submitted its Report on the continuance of protection to the Power and Distribution Transformers Industry on the basis of an inquiry undertaken by it under Sections 11(e) and 13 of the Tariff Commission Act, 1951 (50 of 1951). Its recommendations are as follows :—

- (1) Protection to the transformer industry should be continued for a further period of three years ending 31st December, 1968 at the existing duty of 10 per cent *ad valorem* on transformers upto 50,000 KVA and 220 KV on the H.T. side and parts of such transformers, not otherwise specified, falling under I.C.T. item No. 72(39). This is exclusive of the regulatory customs duty as well as the surcharge.
- (2) As the level of production of laminations and consequent production of transformers would depend entirely on the availability of electrical steel sheets, larger allocation of foreign exchange for import is imperative for the future development of the industry.
- (3) The delays in the allocation of foreign exchange to expansion projects of transformer manufacturers and the issue of import licences must be minimised.
- (4) It would be advisable to include the production of steel strips in 16 SWG also in the future production programme of the Rourkela Steel Works.
- (5) Early steps should be taken by Government for the substitution of indigenous material for imports in all spheres where opportunities exist within the country. The production of CRGO sheets during the Fourth Plan period in preference to hot rolled sheets programmed for production at Rourkela plant of Hindustan Steel Ltd. should be explored.
- (6) As the transformer manufacturers are finding it difficult to procure M.S. plates and sections from indigenous sources, high priority ought to be given to the transformer industry in the allocation of M.S. steel plates.
- (7) The Indian Electrical Manufacturers' Association has pleaded for a substantial increase in the allocation of copper to the wire manufacturers. It has also desired the Government to

enter into an agreement with the producer country directly, if possible. This may be examined by Government.

- (8) Government may examine the various suggestions made by the transformer industry for improving exports.
- (9) The possibility of manufacture of seam welded radiators indigenously may be explored by the Directorate General of Technical Development.
- (10) The Development Commissioner, Small Scale Industries, should, in consultation with the Directorate General of Technical Development, evolve a suitable arrangement for meeting the reasonable raw material requirements of the small scale units.
- (11) In order to unify the requirements of various users, an organisation like the Central Water and Power Commission could initiate collaboration amongst the purchasers of transformers to reach an agreement regarding the general acceptance of Indian Standard Specifications.
- (12) There is scope for immediate reduction of delivery periods provided the planning of purchases by the Electricity Boards is well organised foreseeing their requirements of transformers in advance according to the schemes approved and awaiting implementation by them.
- (13) Dimensional standardisation of bushings above 11 KV should be completed expeditiously with the concurrence of the principal transformer users so that the bushing manufacturers will have no difficulty in adopting the ISI specifications.
- (14) The adoption of ISI standards by the manufacturers of transformers and of components would remove the various shortcomings that are being found owing to the multiplicity of designs in use in the country. The State Electricity Boards should therefore adhere to the ISI standards in placing their orders with the producers for their future requirements of transformers.
- (15) It is necessary for indigenous manufacturers to keep abreast of developments in other countries and to undertake research and development themselves.

2. Government have given careful consideration to recommendation (1) and having regard to the fact that in the present circumstances there is no likelihood of any unhealthy competition from imports and in view of the rate of duty on protected categories of power and distribution transformers and component parts thereof having gone up under the Finance (No. 2) Act, 1965 beyond the level of protective rate recommended by the Tariff Commission, Government consider that tariff protection to the Power and Distribution Transformers Industry need not be continued beyond 31st December, 1965.

(v)

Government, however, propose to continue the rate of duty as at present. Necessary legislation to implement Government's decisions will be undertaken in due course.

3. Government have taken note of recommendations (2) to (6) and (8) to (11) and steps will be taken to implement them as far as possible. Attention of the purchasers of transformers is also invited to recommendation (11). Government have noted recommendation (7).

4. Attention of the State Governments is drawn to recommendations (12) to (14). Attention of the principal transformer users and the bushing manufacturers is drawn to recommendation (13) and that of the manufacturers of transformers and of components to recommendation (14).

5. Attention of the manufacturers of transformers is also invited to recommendation (15).

ORDER

ORDERED that the Resolution be published in the Gazette of India and a copy thereof communicated to all concerned.

(Sd.) P. K. J. MENON,

Joint Secretary to the Government of India.

नमो भगवते वासुदेवाय

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REPORT ON THE CONTINUANCE OF PROTECTION TO THE POWER AND DISTRIBUTION TRANSFORMERS INDUSTRY

1. In 1952 the Tariff Commission examined for the first time the claim of protection of the power and distribution transformers industry. It was then recommended that the import duty of 5 per cent *ad valorem* on power and distribution transformers upto 2,500 KVA and 37.5 KV on the H.T. side excluding furnace, rectifier and flame proof transformers should be increased to 10 per cent *ad valorem* exclusive of the surcharge of 5 per cent of the duty. The recommendation was accepted by Government and protection was granted upto the end of 1955. It was extended for another year upto the end of 1956 in consultation with the Commission. The second inquiry into the industry was held in January 1956 and the Commission recommended that protection at the same rate of duty be continued for a further term of four years ending December 1960. The scope of protection was, however, made applicable to power and distribution transformers upto 3,000 KVA and 37.5 KV on the H.T. side. These recommendations were accepted by Government and implemented. In 1960 the third inquiry was held by the Commission and the continuance of protection at the then existing duty of 10 per cent was recommended for a further period of three years ending 31st December 1963. It was made applicable to power and distribution transformers upto 10,000 KVA and 132 KV on the H.T. side. Government accepted these recommendations and protection was continued till the end of December 1963, by the Indian Tariff (Amendment) Act, 1960. The fourth inquiry by the Commission was held in 1963 when it recommended continuance of protection for a further period of two years ending December 1965, at the existing rate of 10 per cent *ad valorem*. The scope of protection was, however, extended to cover power and distribution transformers upto 50,000 KVA and 220 KV on the H.T. side. The recommendation was accepted by Government and protection was accordingly continued till the end of December 1965.

2. The present inquiry has been undertaken by the Commission under Section 11(e) read with Section 13 of the Tariff Commission Act, 1951 to examine and report on the action required in relation to the continuance or otherwise of protection to the power and distribution transformers industry.

3.1. A press note was issued on 30th December 1964 inviting firms, associations and others interested in the inquiry to obtain copies of the relevant questionnaires from the Commission and forward their replies. Special questionnaires were also issued to producers, importers and consumers of power and distribution transformers. The Directorate General of

Technical Development (D.G.T.D.) was requested to send a detailed memorandum on the progress made by the industry since the last inquiry and its present position. The Ministry of Commerce was requested to intimate the latest position regarding the implementation of the various ancillary recommendations contained in our last Report. The Development Commissioner, Small Scale Industries, was requested to send a memorandum regarding the position of the industry in the small scale sector. The Central Water and Power Commission (C.W.P.C.) was requested to enlighten us regarding the present and future requirements of transformers in the country. Data regarding c.i.f. prices and landed costs of imported transformers were sought from the Collectors of Customs at principal ports. Government of India Trade Representatives in U.K., West Germany, U.S.A. and Japan were requested to furnish the latest f.o.b. quotations of transformers exported from those countries. The Indian Electrical Manufacturers' Association, Calcutta, was addressed for a memorandum on the various aspects of the industry. The Indian Standards Institution was requested to intimate whether any new standard specification for transformers had been published or if any of the existing ones were revised since the last inquiry. The Ministries of Petroleum and Chemicals, and Steel and Heavy Industries, the Director General of Commercial Intelligence and Statistics and the Engineering Export Promotion Council were addressed for information on certain specific issues. Information was also elicited regarding the availability and prices of raw materials. The Directors of Industries of certain States were requested to furnish information regarding units located in their respective States. The views of the Chief Secretaries of all the States were invited if they were interested in the industry. A list of those to whom Commission's questionnaires and letters were issued and from whom replies or memoranda were received is given in Appendix I. The factories visited by the Commission and its officers are listed in Appendix II.

3.2. In connection with this inquiry we selected three units in the industry for cost investigation. They are Hackbridge-Hewitt and Eason Ltd., Madras, Associated Electrical Industries Manufacturing Co. (P) Ltd., Calcutta and National Electrical Industries Ltd., Bombay. The accounts of these units were examined by our Cost Accounts Officers.

3.3. A public inquiry into the industry was held on 30th March 1965. A list of persons who attended the inquiry is given in Appendix III.

- 4.1. The recommendations made by us in our last Report (1963) on matters other than tariffs and the extent to which they have been implemented are briefly stated below :—
4. Implementation of Commission's ancillary recommendations made in its last Report (1963)

4.2. Recommendation 1.

"Government should implement the programme of doubling the capacity of Heavy Electricals Ltd., Bhopal and initiate

plans for further expansion of its transformer capacity. They may also accord preference to the existing producers for further expansion of their capacity and should take steps well in advance to augment industry's capacity to avoid conditions of shortage."

The Ministry of Industry and Supply (Department of Heavy Engineering) has informed us that Heavy Electricals Ltd., has submitted a proposal for the expansion of its manufacturing capacity for power transformers from 3 million to 6 million KVA in the Fourth Plan. The D.G.T.D. has stated that some expansion schemes of the private sector for manufacture of large power transformers have been sanctioned.

4.3. *Recommendation 2.*

"Government should take immediate and effective steps to see that the transformer grade electric sheet steel planned for production at Rourkela from April 1966 will be of the CRGO (Cold Rolled Grain Oriented) variety. An assurance to this effect will further help change over to this material by the producers."

The late Ministry of Steel, Mines and Heavy Engineering had stated that although it was difficult to manufacture transformer grade electric sheet steel of the Cold Rolled Grain Oriented variety efforts would be made for its production in the Fourth Plan.

4.4. *Recommendation 3.*

"The Government should make a survey of the insulator industry and if it is found that the existing capacity for bushings requires to be increased and/or diversified, it may be done at the earliest opportunity."

We understand that some of the porcelain factories have recently been licensed to manufacture bushings of higher ratings and that 22 KV and 33 KV bushings are now available indigenously.

4.5. *Recommendation 4.*

"Higher priority should be given to the industry in the matter of allocation of steel".

The Ministry of Steel & Heavy Industries has stated that a Steel Priority Committee has been set up to assign priorities for different Ministries and important projects. As there is no standing priority for the power and distribution transformers industry for allocation of steel, the Steel Priority Committee will consider allocation against specific requirements as and when sponsored by concerned authorities. However, according to the information received from the D.G.T.D. the transformer manufacturers are experiencing difficulties in procuring M.S. sheets (plates) from indigenous sources.

4.6. *Recommendation 5.*

"The Central Water and Power Commission should disseminate necessary information to the State Electricity Boards and other consumers regarding the advantages of the use of CRGO sheets and advise them to give preference to transformers with such sheets."

The C.W.P.C. has addressed circular letters to all State Electricity Boards inviting their attention to this recommendation and has requested them to encourage the use of CRGO sheets in the industry by giving preference to transformers using CRGO sheets.

4.7. *Recommendation 6.*

"The Central Water and Power Commission should intensify its efforts to achieve as complete a standardisation of distribution transformers as possible and to some extent also of the smaller power transformers not only in respect of preferred sizes but also for L.T. voltage, tapplings, impulse level, fittings, sizes, etc. State Governments, Electricity Boards and Electricity Undertakings, in turn, should spare no efforts to co-operate in this endeavour which is of material advantage alike to consumer and producer".

The Ministry of Irrigation and Power stated that an Indian Standard has already been published for distribution transformers and therefore no further standard appears to be necessary. But it is found that each Electricity Board has its own preferred ratings and these are necessarily not the ratings accepted by the Indian Standards as standard or preferred standard ratings. Much as the manufacturers would like to make standard rating transformers they could not ignore the enquiries which do not conform to the standard ratings. Adherence to standard ratings is desirable and this question is further discussed in paragraphs 10.2.2. to 10.2.4.

4.8. *Recommendation 7.*

"To obviate a situation where the industry might suffer from lack of timely supplies Government might permit more liberal imports of sheet steel and allow producers to carry a larger stock".

The Ministry of Industry and Supply has stated that efforts are being made to increase foreign exchange allocation to import electric sheet steel and also for establishing indigenous manufacture. The Ministry feels that till indigenous production is organised, the difficulty in obtaining this item will continue.

4.9. *Recommendation 8.*

"The producers of transformers should change over to the use of Cold Rolled Grain Oriented (CRGO) sheets in the shortest possible time. The supply of imported raw materials

should be regulated so as to ensure a more effective use consistent with the adoption of CRGO sheets. Government may also consider laying down a phased programme for a change-over to CRGO sheets and for the reduction of the import of hot rolled sheets."

The Ministry of Industry and Supply has informed us that the manufacturers are at present unable to get their full requirements of CRGO sheets and as and when the supply position improves there would be no difficulty in the implementation of this recommendation.

4.10. *Recommendation 9.*

"The classification of imports data for transformers recommended in the Commission's 1960 Report should be made applicable to the Monthly Statistics of Foreign Trade of India."

This recommendation has been only partly implemented. It is discussed in paragraph 12.2.

4.11. *Recommendation 10.*

"The producers of transformers in their own interest should extend their full co-operation in reducing the number of sizes and designs of bushings particularly of lower voltages and they should plan their procurement programme well in advance with the bushings manufacturers."

It is observed that the producers have standardised their requirements of bushings as per IS specification and they generally use one type of bushing upto 11 KV and another for 22 KV. But the Government Porcelain Factory has stated that there continues to be diversity of designs which precludes it from manufacturing for stock of any particular item. However, there does not seem to be any evidence of a procurement programme of the producers. Still we are informed that the matter is being pursued by the D.G.T.D.

4.12. *Recommendation 11.*

"As transformers form an essential link in the power transmission and distribution system requiring utmost reliability under continuous service, producers should take due care during their manufacture and in packing so as to avoid even complaints of a minor nature."

We are assured that adequate precautions are being taken in the manufacture and packing of transformers and the D.G.T.D. is also examining the issue.

4.13. *Recommendation 12.*

"Producers should offer lower prices for transformers of standard specifications as compared to those deviating from standards as an incentive towards achieving the object of standardisation."

This is not being uniformly followed by the producers. While some of them offer standard types at a slightly lower price, others are not making any difference in the prices quoted by them. The matter is, however, being pursued further by the D.G.T.D.

4.14. Recommendation 13.

“As the high prices of transformers would, in turn, step up the cost of electricity, every attempt has to be made by producers of transformers and all concerned in its development to bring down the prices.”

The producers are of opinion that any reduction in prices of transformers may not be possible as long as they have no control on the prices of raw materials and on labour costs. The D.G.T.D., however, is said to be examining the position.

5. The present scheme of protection covers transformers upto 50,000 KVA and 220 KV on the H.T. side, but excluding furnace, rectifier and flame proof transformers. Electric Construction and Equipment Co. Ltd. suggested that the scope of the inquiry should also cover furnace, booster and auxiliary transformers. This suggestion was discussed at the public inquiry and we found that these items were not yet sufficiently significant to justify inclusion within the scope of protection. H.E.L. desired widening of the scope to cover transformers of upto 250,000 KVA and 220 KV on the H.T. side as it has delivery commitment for such transformers upto 1967. As the bulk of the present output particularly in the private sector is far below this range we feel that a widening of the scope any further at present for purposes of protection may not be necessary. We have accordingly decided to retain the present scope of the inquiry.

6.1. At the time of the last inquiry there were 17 units effectively in operation besides Heavy Electricals Ltd., Bhopal. The total installed capacity of the industry inclusive of H.E.L. was 3.98 million KVA in 1963. H.E.L.'s licensed capacity of 3 million KVA on double shift was to be built up progressively manufacturing transformers totalling 1.4 million KVA in 1963-64, 1.9 million KVA in 1964-65 and 2.6 million KVA in 1965-66. Eight existing units were reported to have been granted licences for expansion of their capacity. Two new units were licensed for the manufacture of transformers. With the implementation of these expansion schemes the total capacity of the industry was expected to be 7.38 million KVA as under :

A. Existing capacity

17 Units	2,578,800 KVA
Heavy Electricals Ltd.	1,400,000 KVA
TOTAL	<u>3,978,800 KVA</u>

B. Additional capacity licensed

8 Existing units	1,150,200 KVA
Heavy Electricals Ltd.	1,600,000 KVA
2. New units	650,000 KVA
TOTAL	3,400,200 KVA
Total (A plus B)	7,379,000 KVA
	(i.e. 7.38 million KVA)

6.2. Present position of the industry.

6.2.1. There are at present 18 units effectively in operation besides H.E.L. India Electric Works, Calcutta continues to remain closed but Hindustan Electric Co.'s Howrah Works which was closed at the time of the last inquiry has recommenced production in December 1963. The total capacity of the 18 units as furnished by the D.G.T.D. is 2,073,800 KVA exclusive of H.E.L. The capacity figure as given by the producers comes to 3,250,900 KVA. The difference is primarily due to the higher capacity figures of Electric Construction and Equipment Co. and Hackbridge Hewittic and Easun than those reported by the D.G.T.D. It was agreed at the public inquiry that the higher figures of capacity as reported by the producers could be adopted. Therefore, if the existing capacity of 1.4 million KVA of H.E.L. is included, the total capacity comes to 4.65 million KVA. Eight of the existing units were reported to have been granted additional capacity of 2,750,200 KVA as under :

Name of the firm	Additional capacity licensed/awaiting implementation (KVA)
1. Bharat Bijlee Ltd.	120,000
2. Transformer & Switchgear Ltd.	49,200
3. Govt. Electric Factory	516,000
4. Kirloskar Electric Co.	225,000
5. Indian Transformers	40,000
6. Electric Construction & Equipment Co. Ltd.	150,000
7. Andhra Pradesh Electrical Equipment Corporation	50,000
8. Heavy Electricals Ltd.	1,600,000
TOTAL	2,750,200

It is observed that six of them have not established their additional capacity so far. In the case of Government Electric Factory, the additional capacity has been transferred to the New Government Electric Factory, Bangalore.

6.2.2. The D.G.T.D. has stated that the units in the private sector have been engaged in the manufacture of distribution and medium sized power transformers only. According to the Directorate the H.E.L. will have established a capacity of 6 million KVA per annum covering all ranges of power transformers by the end of the Fourth Plan. It is stated that Government have also sanctioned some expansion schemes in private sector for larger power transformers and some of them have already taken effective steps to supply transformers upto 20,000 KVA ratings. More medium and large power transformers upto about 20,000 KVA ratings will hereafter be manufactured in the private sector. H.E.L. has also increased its production capacity of larger step-up and step-down types of power transformers and their current level of production is about 1.4 million KVA per annum.

6.3. With regard to future expansion according to the information furnished by the D.G.T.D. six new units have been licensed and seven more schemes for a total annual capacity of 1.69 million KVA have been issued with 'letters of intent'. Five of them are for expansion of the existing units and two are for establishing new units. Kerala Heavy Electricals Project which was reported as a new unit at the time of the last inquiry is included in the list of new units now given and its name has been given as Transformers and Electricals (Kerala) Ltd. The firm has informed us that it was incorporated in December 1963 for the manufacture of heavy power transformers ranging from 1,000 KVA to 50,000 KVA and 132 KV in collaboration with Messrs. Hitachi Ltd. of Japan. It intends to go into production by the middle of this year. The additional capacity licensed is as under :

	Additional capacity licensed/awaiting implementation (KVA)
Eight existing units	890,200
Six new units	1,728,000
TOTAL	2,618,200

As regards expansion schemes of the existing producers, except Emco Electricals (P) Ltd. and National Electrical Industries Ltd., other schemes are the same as those given in the last Report. It means that they have yet to implement their plans. According to D.G.T.D. the additional capacity will be implemented by the end of this year. The table on next page shows the annual installed capacity of individual units as assessed at the last inquiry and their present capacity as adopted by us.

Statement showing annual installed capacity of the units at the time of the last inquiry and their present adopted installed capacity

Sl. No.	Name of the unit	Annual installed capacity in 1963 (KVA)	Expansion granted at the time of the last inquiry (KVA)	Total capacity after expansion (KVA)	Installed capacity adopted for the present inquiry (KVA)
1	Crompton Parkinson (Works) Pvt. Ltd., Bombay	350,000	..	350,000	275,000
2	Associated Electrical Industries Mfg. Co. (Pvt.) Ltd., Calcutta.	90,000	..	90,000	120,000
3	National Electrical Industries Ltd., Bombay	300,000	..	300,000	240,000
4	Government Electric Factory, Bangalore.	84,000	516,000	600,000	42,000
5	Bajaj Electricals Ltd., Bombay	60,000	..	60,000	120,000
6	Radio and Electricals Ltd., Madras.	102,000	..	102,000	120,000
7	Electric Construction & Equipment Co. Ltd., Calcutta	250,000	150,000	400,000	600,000
8	Emco Transformers (P) Ltd., Bombay (Formerly Gandhi Electric Industries)	100,000	..	100,000	140,000
9	General Electric Co. of India Mfg. Ltd., Calcutta	200,000	..	200,000	200,000
10	Kirloskar Electric Co. Ltd., Bangalore	250,000	225,000	475,000	175,000
11	Bharat Bijlee Ltd., Bombay	100,000	120,000	220,000	72,000
12	Hackbridge-Hewittic & Easun Ltd., Madras	350,000	..	350,000	600,000
13	Transformer & Switchgear Ltd., Madras	100,800	49,200	150,000	150,000
14	Indian Transformers Ltd., Alwaye	10,000	40,000	50,000	9,900
15	Pradip Lamp Works Ltd., Patna	60,000	..	60,000	30,000
16	Andhra Pradesh Electrical Equipment Corp., Visakhapatnam.	100,000	50,000	150,000	150,000
17	Hindustan Electric Co. Ltd., Bombay (Howrah Works).	Closed down	..	..	135,000
18	Hindustan Electric Co. Ltd., Bombay (Baroda Works)	72,000	..	72,000	72,000
19	Heavy Electricals Ltd., Bhopal	1,400,000	1,600,000	3,000,000	1,400,000
	TOTAL	3,978,800	2,750,200	6,729,000	4,650,900

6.4. The Development Commissioner, Small Scale Industries, has informed us that there are 17 small scale units manufacturing transformers in the country. Statewise distribution of these units is as follows :—

Name of the State	No. of units
West Bengal	6
Maharashtra	3
Gujarat	2
Mysore	2
Andhra Pradesh	1
Madhya Pradesh	1
Bihar	1
Kerala	1
TOTAL	17

Necessary details about these units are not available.

7.1. The total production of transformers classified according to ratings during the years 1963 and 1964 is given in the following table. The production has increased from 14,104 Nos. totalling 3.31 million KVA to 15,381 Nos. totalling 4.26 million KVA during the two-year period.

7. Production

Statement showing rating-wise production of transformers during 1963 and 1964

	1963			1964		
	No.	KVA	% in terms of KVA	No.	KVA	% in terms of KVA
Upto 25 KVA	4,827	103,520	3.1	6,207	125,748	3.0
Above 25-75 KVA	4,371	233,143	7.0	3,152	171,585	4.0
Above 75-250 KVA	3,190	456,615	13.8	3,918	544,055	12.8
Above 250-500 KVA	894	395,803	12.0	1,012	430,715	10.1
Above 500-1000 KVA	475	404,729	12.2	570	476,070	11.2
Above 1000-2000 KVA	134	210,200	6.4	238	392,450	9.2
Above 2000 KVA	213	1,504,600	45.5	284	2,115,000	49.7
TOTAL	14,104	3,308,610	100.00	15,381	4,255,623	100.00

NOTE.—The range 1500-3000 KVA furnished by Heavy Electricals has been included in the range 1000-2000 KVA.

A statement showing the production of transformers by individual firms in terms of numbers and KVA is given in Appendix IV.

7.2. The D.G.T.D. has furnished the following estimates of production for the next four years:

Year	Million KVA
1965	4.00
1966	4.75
1967	5.50
1968	6.00

8.1. For determining the requirements of transformers in terms of KVA, the Commission at the time of the last inquiry had retained the factor of 5.0 adopted in its 1960 Report. On the basis of this multiplier factor the requirements of transformers in KVA was estimated to be 5 times the addition to the generating capacity in KW. This multiplying factor was intended to cover the full requirements of power and distribution transformers. On this basis the Commission arrived at an estimate of demand of transformers of 5 million KVA in 1963-64. Expecting additions to the generating capacity to rise steeply the Commission estimated that the demand for transformers would be 10 million KVA in 1964-65 and 17 million KVA in 1965-66.

8.2. In arriving at a multiplying factor for the future it is generally the practice to check up the rate at which demand for transformers has increased taking the apparent availability of transformers in relation to generating capacity in the preceding two or three years. The continuance of this practice has not been possible owing to the incompleteness and unreliability of the data concerning imports of transformers. Import statistics published by the Director General of Commercial Intelligence and Statistics are in terms of numbers only and not their total KVA. Though he has been reporting to the Commission the import data on the lines of the Commission's recommendation in its last Report, there is a divergence between published statistics and the data received by the Commission both in respect of their numbers and value and it has not been possible to reconcile them. Besides, the data of imports supplied to us by the D.G.C.I. & S. cover only transformers of upto 50,000 KVA and 220 KV. They, therefore, do not indicate the full extent of imports of transformers. For these reasons it is not possible to arrive at a reasonably correct figure of apparent availability of transformers during the last two years. Consequently we could not work out a multiplying factor on the basis of availability of transformers and compare it with the multiplying factor of 5 that was adopted in our last inquiry.

8.3.1. In connection with our present inquiry we have received from important organisations their estimates of demand indicating the

multiplying factors adopted by them. The Indian Electrical Manufacturers' Association, Calcutta, has adopted a multiplying factor of 6.2 assuming the capacity of step-up transformers to be 1.2 times the increase in generating capacity. The capacity of step-down transformers will be approximately 1.8 to 2 times the increase in generating capacity and the capacity of distribution transformers will be 3 times the average generating capacity. Taking a moving average of the addition to the generating capacity during the next three or four years, it has estimated the total demand for transformers at 10.71 million KVA in 1966-67, 11.45 million KVA in 1967-68, 11.18 million KVA in 1968-69 and 12.20 million KVA in 1969-70. The increase in demand as estimated by the Association is gradual and smooth on account of the moving average of additions to generating capacity taken by it.

8.3.2. The D.G.T.D. expects the demand for power transformers expressed in KVA will be about 4 times the generating capacity expressed in KW and that for distribution transformers and other transformers expressed in KVA will be about 2.6 times the addition of power. In other words, the Directorate has adopted the multiplying factor of 6.6. It has assumed that the additions to power generating capacity during the next four years will be of the order of 1.8 million KW in 1965, 2.0 million KW in 1966, 2.2 million KW in 1967 and 2.4 million KW in 1968. Applying the multiplying factor to this rate of power generation it has arrived at the estimate of demand of 11.5 million KVA in 1965, 13.0 million KVA in 1966, 14.3 million KVA in 1967 and 15.5 million KVA in 1968.

8.3.3. The Central Water and Power Commission has also made estimates of increase in power generation and the consequent demand for transformers in the ensuing years. It has also adopted the same multiplying factor of 6.6 as the D.G.T.D. It has taken 4 times the generating capacity for power transformers and 2.6 times the generating capacity for distribution transformers. The C.W.P.C. has furnished figures of additional generating capacity and its estimates of demand for transformers which are given below:

Year	Addition to generating capacity (million KW)	Addition to step-up and step-down transformers (million KVA)	Addition to distribution transformers (33 KV and below) (million KVA)	Addition to transformer capacity Col. 3 plus Col. 4 (million KVA)
1	2	3	4	5
	(4 times Col. 2) (2.6 times Col. 2)			
1963-64	0.58 (Actual)	2.32	1.53	3.85
1964-65	1.15	4.60	2.99	7.59
1965-66	2.78	11.12	7.23	18.35
1966-67	3.09	12.36	8.04	20.40
1967-68	1.33	5.32	3.46	8.78
1968-69	2.30	9.20	5.98	15.18

The C.W.P.C. appears to have taken the target figures of power generation as fixed by it for the ensuing years. Therefore, its estimates of demand show sudden spurts and declines unlike the smooth increase in the estimates of Indian Electrical Manufacturers' Association (IEMA). It may also be observed that while both the D.G.T.D. and C.W.P.C. have adopted the same multiplying factor of 6.6, their estimates of demand vary. This is on account of the fact that the D.G.T.D. has adopted different sets of figures for additions to generating capacity from the figures furnished by the C.W.P.C.

8.3.4. To derive a multiplying factor from whatever data that was available regarding the total transformers commissioned for use in the two years 1961 and 1962, we worked out the ratio of transformers KVA to additions to generating capacity. It was found to be 6.98 for 1961 and 5.93 for 1962. Here we assumed that all imported transformers were either power or distribution transformers which was in fact not true. If suitable deductions were made from the imported figures the multiplier would have been somewhat lower. Even to calculate these rough estimates of multiplying factor it has not been possible for the years 1963 and 1964. We have, therefore, been compelled to fall back upon other methods of adopting a multiplying factor for the future.

8.3.5. It may, however, be mentioned that there is no mathematical formula to determine the precise relationship between transformer capacity and generating capacity. At best only an empirical ratio can be found which will vary from place to place and would certainly be different for different types of loads. Where the load factor is high and the load is well developed and staggered, the ratio would be low. In places where load is yet to develop and the emphasis is on rural electrification and lift irrigation, the ratio may be high because considerable idle transformer capacity has to be provided for to cater for dispersed loads. Where provision has to be made in anticipation of load building up and a high load factor developing gradually, a higher multiplying factor would be necessary.

8.3.6. In order to arrive at an empirical basis for a suitable multiplying factor in a well developed area we selected the Bombay-Poona area for a study. We found that the multiplying factor for the area was approximately 5.2. Obviously, in less developed areas the multiplying factor should be higher than 5.2. But it could not be higher than 5.93 which we reached on the basis of rough estimates of availability of transformers during the year 1962. Thus the ratio of 6.6 suggested by the C.W.P.C. and D.G.T.D. appears to be on the high side. In the circumstances, we feel that for estimating future demand a ratio of 5.5 with the following break-up may be appropriate:

Step-up transformer MVA to Generator MW.	1.2
Step-down transformer MVA to Generator MW.	2.0
Distribution and other transformers MVA to Generator MW	2.3
TOTAL	5.5

On the above basis and taking into account a three year moving average of additions to power generating capacity (C.W.P.C.'s estimates) we offer the following estimates of demand for the current and the ensuing years :

Year	Addition to generation capacity (3-year moving average) Million KW	Addition to Power transformer capacity Million KVA	Addition to distribution transformer capacity Million KVA	Addition to total transformer capacity Million KVA
1	2	3	4	5
1965-66	1.50	4.80	3.45	8.25
1966-67	2.34	7.49	5.38	12.87
1967-68	2.40	7.68	5.52	13.20
1968-69	2.24	7.17	5.15	12.32

9.1. The principal raw materials and components required for the manufacture of transformers are as follows:

9. Raw materials

1. Electric sheet steel (silicon steel) :
 - (a) hot rolled and (b) cold rolled grain oriented.
2. Insulated copper strips and wires (mainly paper insulated).
3. Porcelain bushings :
 - (a) high tension and (b) low tension.
4. (a) cooling tubes : (i) circular and (ii) elliptical and (b) radiators.
5. Mild steel plates and rolled sections.
6. Transformer oil.
7. (a) Paper based insulating materials like presspan leatheroid, etc., boards, tapes and phenolic bonded paper tubes (ii) insulating varnishes.
8. Components and miscellaneous items :
 - (a) Thermometers (dial type or mercury-in-glass type) ;
 - (b) Cable boxes ;
 - (c) Terminal components ;
 - (d) Off-load tap changing switches ;
 - (e) On-load tap changing switches ;
 - (f) Silica-gel-breathers ;
 - (g) Oil level gauges ;

- (h) Relays ;
- (i) Synthetic rubber gaskets ; and bonded cork sheets ;
- (j) Bolts, nuts, screws, washers ;
- (k) Paints, etc.

We observed in our last Report that raw materials constituted about three-fourths of the total ex-works cost of the transformers, and electric sheet steel and insulated copper accounted each for 25 to 30 per cent of the cost of raw materials and components. This position does not seem to have varied much even now. The bulk of the materials are still being imported.

9.2.1. *Electric sheet steel.*

9.2.1.1. Electric sheet steel required for the manufacture of transformers is of a special grade which is not being produced in the country at present. Therefore the entire requirement of hot rolled and cold rolled varieties is being imported. According to the D.G.T.D. the requirement of electric sheet steel for the transformer industry is likely to increase from 15,000 tonnes in 1965 to 35,000 tonnes in 1968. It has also stated that the present supply from imports is of the order of 14,000 tonnes. The estimate of demand for raw materials has to be realistic and should bear a reasonably constant ratio to the estimate of demand for transformers. The basis on which the D.G.T.D. has estimated the demand for sheets to increase from 15,000 tonnes in 1965 to 35,000 tonnes in 1968 has not been indicated and the estimates also do not bear a constant ratio to the estimate of demand for transformers. On the basis of requirements of 1.638 kg. of laminations per KVA (average for three 1000 KVA transformers) the demand for laminations has been estimated to be as follows :

Year	Demand for P. & D. transformers	Wastage 20% Tonnes	For Other transformers 10%	Total
1965-66	13,510	2,702	1,351	17,563
1966-67	21,100	4,220	2,110	27,430
1967-68	21,620	4,322	2,162	28,104
1968-69	20,180	4,036	2,018	26,234

We are informed that there are plans to produce transformer grade steel at one of the steel plants in the public sector but the I.E.M.A. has observed that the transformer grade sheets planned for production at Rourkela Works of Hindustan Steel Ltd. would be of hot rolled variety and not of CRGO variety as planned earlier. This would not be helpful as we have been urging the producers to change-over from the hot rolled to CRGO variety to improve the performance of transformers and also to effect economies in the materials, particularly imported ones, in the construction of transformers.

9.2.1.2. *Capacity for laminations.*—There are two units namely, Guest, Keen, Williams Ltd.,—Sankey Division and Devidayal Stainless Steel Industries Pvt. Ltd.,—Electrical Stampings Division, engaged in the manufacture of transformer laminations. Details of their capacity are as follows :

(In tonnes)

Sl. No.	Name of the unit	Annual licensed capacity	Annual installed capacity (2 shift basis)	Annealing capacity for CRGO sheets
1	G. K. W.—Sankey Division—			
	Bhandup Factory	6,000	4,000	3,000
	Calcutta Factory	3,000	1,800	..
	Bangalore Factory	5,000	4,000	..
		14,000	9,800	3,000
2	Devidayal Stainless Steel Industries	6,000*	2,400	150
	TOTAL	20,000	12,200	3,150

*Total capacity for laminations for transformers and electric motors.

G.K.W. has a plan for the installation of additional annealing furnaces at its Bombay, Calcutta and Bangalore factories and on implementing it its total annealing capacity will be 9,000 tonnes. Devidayal's application for a licence to import annealing plant has been approved by the Capital Goods Committee. When installed its annealing capacity will be 2,000 tonnes per annum on double shift basis. Thus, when the expansion schemes of both the units are implemented their total annealing capacity will be 11,000 tonnes. In respect of laminations G.K.W. has plans to increase its capacity to 14,000 tonnes and the installed capacities of the two companies will then be 16,400 tonnes as against the present capacity of 12,200 tonnes.

9.2.1.3. *Production.*—Production of transformer laminations during 1963 and 1964 is given below :

(In tonnes)

Name	1963			1964		
	HRS	CRGO	Total	HRS	CRGO	Total
G. K. W.—Sankey Division . . . . .	..	..	4,039	..	..	5,671
Devidayal	486	11	497	624	24	648
TOTAL			4,536			6,319

9.2.1.4. A disquieting feature of production of laminations is under-utilisation of capacity of these two manufacturers. Production in G.K.W. in 1963 and 1964 was only 4,039 tonnes and 5,671 tonnes respectively as against an installed capacity of 9,800 tonnes. Devidayal produced only 497 tonnes in 1963 and 648 tonnes in 1964 as against an installed capacity of 2,400 tonnes. This under-utilisation of capacity is attributed to the acute shortage of imported electrical steel sheets. Further, the D.G.T.D. has estimated that the current level of imports of transformer grade steel sheets is of the order of 14,000 tonnes. Since the two producers of laminations have consumed less than half of this, it must be presumed that the balance was imported and processed directly by the manufacturers. As the level of production of laminations and the consequent production of transformers would depend entirely on the availability of electrical steel sheets, we recommend that larger allocation of foreign exchange for import is imperative for the future development of the industry. Unless the total availability of raw materials is improved, these facilities would not be of much avail.

9.2.1.5. *Economies from the use of CRGO core in transformers.*—

In connection with the present inquiry we requested the producers to furnish the comparative design data for one or two sizes of transformers using CRGO and hot rolled sheets. In response to this some information has been furnished. It is found that with the use of CRGO sheets there is a net saving of active materials which are imported. Saving in foreign exchange appears to vary from Rs. 773 to Rs. 855 for a 1000 KVA transformer depending upon the grades used. But still except one or two producers, other producers have not fully implemented our recommendation in the last Report to changeover to CRGO variety of sheets. The general complaint of the producers seems to be a lack of response to the change from the State Electricity Boards. Though some users of transformers have replied that they give preference to transformers of CRGO core others stated at the public inquiry that they purchase transformers on the basis of cheaper capitalised cost. It would be a matter for satisfaction if there is a general response from consumers to the changeover recommended by us.

9.2.2. *Insulated copper strips and wires.*

9.2.2.1. Paper covered winding strips and wires are mostly used in the manufacture of transformers. These requirements are met partly from imports and partly from indigenous sources. There are nine units engaged in the manufacture of paper and cotton covered copper strips and wires. The installed capacity of these nine units is 4,049 tonnes per annum and the actual production in 1964 was 3,234 tonnes. We are informed that seventeen more units have been licensed for an annual capacity of 5,620 tonnes. According to the D.G.T.D. the estimated requirements of the transformer industry for insulated copper strips and wires is 16,000 tonnes in 1965 rising to 22,000 tonnes in 1968.

9.2.2.2. Where transformers are to be designed for the lowest cost it is usual to have core material and copper costing approximately equal amounts. Since copper is more expensive than core materials it stands to reason that the weight of copper required in a transformer should be less than this weight of core material which does not appear to be the case in D.G.T.D.'s estimates. As in the case of core material we have estimated the demand for copper at the average rate of 0.768 kg. per KVA (average for three 1,000 KVA transformers) and our estimates are as follows:

Year	Requirements of copper Tonnes
1965-66	6,340
1966-67	9,890
1967-68	10,140
1968-69	9,460

9.2.2.3. I.E.M.A. has stated that though the indigenous manufacture has been firmly established and planned to meet the increased demand, the actual production is short of the requirements, being limited by the allocation of copper to the cable and wire industry and owing to increase in the prices of materials in the international market. It has, therefore, pleaded for a substantial increase in the allocation of copper to the wire manufacturers. It would also like the Government to enter into an agreement with the producer country directly if possible on a long term basis so that there is no drain on the foreign exchange resources on account of the vagaries of the London Metal Exchange. This may kindly be examined by Government.

9.2.2.4. The delivery period turns out to be long on account of the limited copper quota allotted to the producers. There are, however, no complaints against the quality of copper strips and wires. The D.G.T.D. has also observed that the producers of transformers appear to be satisfied with the quality of the indigenous materials.

9.2.2.5. Some success appears to have been achieved in Western countries in the use of aluminium foil for transformer windings. According to a news item appearing in the "Electrical World" the Westinghouse Electric Corporation has produced distribution transformers upto a rating of 167 KVA using all aluminium enamelled foil for windings and solid cast epoxy-resin insulation. The units produced are reported to be smaller, lighter, more reliable and offer the user reduced application cost. The new transformers replace oil cooled units. The new transformers if used dry are reported to have 100% rating or if they are oil cooled the capacity is increased 40% and if

water cooled the rating is increased 125%. It is necessary for indigenous manufacturers to keep abreast of developments in other countries and to undertake research and development themselves.

9.2.3. Porcelain bushings.

9.2.3.1. The transformer industry gets its requirement of bushings both from imports and from indigenous sources. The indigenous manufacturers are the following :

Name	Manufacture of bushings
1. Hindustan Potteries, Calcutta	Upto 6.6 KV
2. Bengal Potteries Ltd., Calcutta	Upto 33 KV
3. Bengal Porcelain Co., Calcutta	Upto 33 KV
4. Government Porcelain Factory, Bangalore	Upto 132 KV
5. Seshasayee Industries, Vadalur	Not available
6. Bihar Government High Tension Insulator Factory, Ranchi	Not available

The D.G.T.D. has informed us that four more units have been licensed to set up manufacturing capacity. The capacity of the existing units for bushings alone is not available as their capacities are for insulators of which bushings are only one item. However, D.G.T.D. has stated that they meet the requirements of bushings upto 33 KV. Still there is evidence of imports of all ranges by the producers. We had recommended in our last Report that the producers of transformers should reduce the number of sizes and designs of bushings and they should plan in advance their procurement programme. It is now learnt that they have reduced the number of sizes and achieved considerable standardisation. Many of them claim to follow the ISI specification 1180-1958. But still there does not seem to be standardisation on an appreciable scale among the State Electricity Boards. Dimensional standardisation above 11 KV should be completed expeditiously with the concurrence of the principal transformer users. The bushing manufacturers will then have no difficulty in adopting the ISI specifications. The Government Porcelain Factory has observed that it is for the transformer manufacturers to take action on the recommendation of the Commission regarding standardisation. It has standardised upto 33 KV and is manufacturing accordingly but there is still demand for other designs, which cannot be ignored. The quality of indigenous bushings by and large seems to be satisfactory.

9.2.3.2. The producers of transformers are of the view that the delivery period for bushings is rather long and protracted and that supply is inadequate and irregular. Long delivery period has been attributed by the bushing manufacturers to the diversity of designs which precludes manufacture of any item for stock. Since every order

has to be taken as a special order there is no opportunity for long runs and hence there is delay in supply. If the consumers could give an order for their consolidated annual requirements in advance the scope for complaints regarding protracted deliveries would be considerably reduced. The producers of transformers have also observed that prices of indigenous bushings are generally high compared to those of imported products, but from the figures supplied to us the margin of difference does not appear to be very high.

9.2.4. Cooling tubes and radiators.

9.2.4.1. The greater part of the demand for cooling tubes, round and elliptical, is being met by three indigenous manufacturers, namely, Indian Tube Co., Calcutta, Tube Products of India, Madras and Premier Automobiles Ltd., Bombay. The capacity for transformer tubes is not separately available. Production of transformer tubes as stated by the manufacturers was as follows :

		(In metres)	
		1963	1964
Premier Automobiles		28,195	30,275
Tube Products of India		5,40,000	4,80,000
TOTAL		5,68,195	5,10,275

Indian Tube Co. has not given its production figures but stated that its despatches of transformer tubes in 1963 and 1964 were 306 tonnes and 399 tonnes respectively. According to D.G.T.D. the estimated future requirements for cooling tubes would be as under:—

1965	4.5 million running feet
1966	5.0 „ „ „
1967	6.0 „ „ „
1968	6.5 „ „ „

9.2.4.2. Producers of transformers are satisfied with the quality of the tubes but they complain about protracted and irregular deliveries and high prices. I.E.M.A. has also reported that the supply position has been erratic though recently there has been some improvement. In its opinion the prices of indigenous tubes are about 20 per cent higher than those of imported ones.

9.2.4.3. The main difficulty of the fabricators of tubes seems to be inadequacy of steel strips for the manufacture of tubes. They are being mostly imported at present. We were informed at the public

inquiry that there is a possibility of steel strips being made at the Rourkela Works of Hindustan Steel Ltd., but it was stated that it would be hot rolled strips in 14 SWG. Since the manufacturers of transformers are using tubes made out of strips in 16 SWG, the indigenous production when available would not be useful unless the material is further processed and reduced to 16 SWG. So it was suggested by the representatives of the tube manufacturers that either the transformer manufacturers may adopt 14 SWG for their purpose or the indigenous production of steel strips may be in 16 SWG. If neither of the alternatives is acceptable, the country would have to depend on imports of steel strips of 16 SWG for an indefinite period. But we gathered at the public inquiry that the producers of transformers were not agreeable to the changeover on account of technical reasons. We, therefore, recommend that in the future planning of production of steel strips at the Rourkela Steel Works it would be advisable to produce strips in 16 SWG also.

9.2.4.4. Requirements of seam welded radiators are met from imports. The possibility of their production indigenously may be explored by the D.G.T.D.

9.2.5. *Mild steel plates and rolled sections.*—The D.G.T.D. has informed us that the requirements of the transformer industry for M.S. plates are being met from indigenous production and this item is not allowed for import. According to D.G.T.D. the demand for M.S. plates and sections is likely to rise from 11,500 tonnes in 1965 to about 16,000 tonnes by 1968. The producers of transformers have stated that the supply of these plates is unsatisfactory and that their prices are also high. The D.G.T.D. has also admitted that the transformer manufacturers are finding it difficult to procure M.S. plates and sections from indigenous sources. We would like to reiterate our recommendation in our 1963 Report that high priority ought to be given to the transformer industry in the allocation of M.S. steel plates.

9.2.6. *Transformer oil.*—Transformer oil is now being wholly imported. The demand for it has been estimated by the D.G.T.D. at 10 million litres in 1965 rising to 15.5 million litres in 1968. The I.E.M.A. has stated that the manufacture of transformer oil should be immediately established within the country. We are informed that the Ministry of Petroleum and Chemicals is making efforts to set up indigenous production of transformer oil.

9.2.7. *Insulating materials.*—It is learnt that paper-based variety of insulating materials are being imported. The firms are reported to be manufacturing paper-based insulating materials suitable for use in transformers. Senapathy Whiteley Ltd., Bangalore, has recently commenced production of Elephantide press boards. Rohtas Industries, Dalmianagar is reported to have been in production of vulcanised fibre sheets for some time. Their total annual capacity is 2,400 tonnes and their production in 1964 was 954 tonnes. The D.G.T.D. has stated that the quality of the product is very satisfactory but the price is relatively high.

9.2.8. *Tap changing switches.*—On-load tap changing switches are imported. Off-load tap changing switches are being manufactured mostly by the producers of transformers. According to the D.G.T.D. a few schemes have been approved for the manufacture of on-load tap changing switches but actual production may take some time.

9.2.9. The representative of the Development Commissioner, Small Scale Industries, pointed out at the public inquiry that the small scale sector was experiencing considerable difficulty in obtaining its requirements of basic raw materials, such as, laminations, copper wires and strips and steel plates for tanks. Whereas the manufacturers of laminations and copper wires and strips have some sort of a regular arrangement with the large scale producers in terms of which regular quotas are allotted to them, there appears to be no such arrangement as far as small scale producers are concerned, with the result that they have to purchase their requirements of copper wires and strips in the open market by paying exorbitant prices. As regards steel plates their requirements are not sufficient to place indents on the primary producers and they have to buy this material also from the open market, where the supply is uncertain and prices are high. In the case of laminations, in the event of short supply the producers give first preference to their regular customers and the requirements of the small scale sector can be met only when spare supplies are available. We, therefore, recommend that the Development Commissioner should, in consultation with the D.G.T.D., evolve a suitable arrangement for meeting the reasonable raw material requirements of the small scale units.

10.1. *Quality.*

10.1.1. The quality of transformers made in India is considered by and large to be good. The manufacturers state that they have not received serious complaints so far regarding the quality of their products. Occasionally there have been complaints regarding oil leakages particularly from studs which we are told have been attended to promptly. With the installation of automatic stud welding equipment this defect will also be eliminated. Quality control departments are set up by the producers to ensure that raw materials, semi-finished products and components going into the manufacture of transformers conform to their quality standards. In our last Report we had suggested that transformers should be carefully packed to ensure safe delivery. We are informed that in spite of careful packing damage is caused by negligent handling by railway staff. The producers have, therefore, taken to road transport to a considerable extent.

10.1.2. The I.E.M.A. has also stated that it has had no occasion to attend to any complaints regarding the quality of transformers produced in the country. The consumers have expressed general satisfaction with the quality of the indigenous transformers. They have said

that minor defects have been attended to when brought to the notice of the producers. A few rare complaints have no doubt been brought to our notice but we hope that the industry would in due course give no room for them. Some Electricity Boards have complained that the guarantee period limited to one year is too short in relation to the life of the transformers. The defects developed after the short guarantee period are rarely attended to by the producers. If the transformers are commissioned soon after their purchase defects, if any, would develop within the first few months and could be rectified by the producers. If there is inordinate delay in commissioning the transformers certain technical defects may develop which would require, special attention and could not normally be covered by the initial guarantee offered by the producers.

10.1.3. The D.G.T.D. is of the opinion that the quality of transformers produced in the country is on the whole quite satisfactory and is comparable with that of transformers manufactured abroad. It has not so far received any complaints from consumers regarding quality. The Development Commissioner for Small Scale Industries and Directors of Industries of some State Governments have also opined that the quality of the transformers of Indian origin is generally good.

10.2. Standard Specification.

10.2.1. The Indian Standards Institution has formulated two standards for transformers, namely, IS-2026-1962 for power transformers and IS-1180-1964 for outdoor type three phase distribution transformers upto and including 100 KVA/11 KV. The former is the general standard for all power transformers of oil-immersed natural cooled type and it adequate meets the present manufacturing requirement of the country. The latter is the Indian standard for distribution transformers upto 100 KVA. This was brought up-to-date in November 1964. The specification covers in detail the standardisation of KVA ratings and introduction of preferred ratings, voltage ratio and tapping ranges, winding connections and vector symbols, oil, standard fittings and the upper limit of losses for hot rolled and cold rolled core steel, etc. As far as losses are concerned, IS-2026-1962 only recommends a certain level of losses for transformers upto and including 100 KVA and 11 KV. The above two standards are based on the present day technique in the manufacture and design of transformers. They take into account the ambient conditions prevailing in the country.

10.2.2. The I.E.M.A. has complained that the buyers in spite of the Commission's recommendations are deviating from ISS in laying down specifications of the transformers required by them and has submitted a list of deviations. We are of the opinion that the adoption of standards by the manufacturers and by the producers of components would remove the various shortcomings that are being found

owing to the multiplicity of designs in use in the country. So we recommend that the State Electricity Boards should adhere to the ISI standards in placing their orders with the producers for their future requirements of transformers.

10.2.3. In our last Report we had expressed the opinion that the use of certification marks particularly for distribution transformers would be conducive to the attainment of standardisation in accordance with the specification laid down by the I.S.I. But the I.E.M.A. has once again reiterated that the use of certification marks for industrial goods like transformers is not necessary since they are manufactured by establishments possessing fully equipped testing laboratories and are purchased by qualified engineers having resources and personnel to inspect and make sure of the quality of goods bought. They also state that compliance with ISS is different from the adoption of certification marks. In view of the prevailing diversity of specifications insisted upon by the State Electricity Boards, the adoption of certification marks by the producers may not be of much avail. Until such time that the buyers of transformers agree to conform to ISI standards in respect of specification of their requirements of transformers it would be futile to insist on the adoption of the certification marks by the producers. In other words, in the present context of producer-consumer relationship, the certification mark is incapable of serving any useful purpose. However, when circumstances change a generalised adoption of the certification marks may be possible.

10.2.4. It would appear that practically all Electricity Boards have their own specification for transformers. At the time when the Indian Standard Specification IS-1180 was first published it was found that the requirements of the indentors varied considerably even in the range of transformers upto 100 KVA and 11 KV. Therefore the specific object of the ISI standards was to unify the requirements of various users at least for distribution transformers so that it would simplify manufacture, reduce cost of production, shorten delivery period and simplify stockings of spares and fittings. This entire purpose would be defeated if the users continue to have their own specifications different from Indian standards. If there are any valid reasons for such deviations, the ISI could examine them and make, if necessary, amendments to the standard and preferred standard ratings but when once a standard specification has been approved it is in the larger interests of the country for the buyers to adhere to them. In a competitive market which now exists for the transformer industry manufacturers cannot be blamed if they cater to varying requirements of the consumers. Since the bulk of the buyers are Electricity Boards and Electricity Undertakings it should not be difficult to arrive at a common understanding regarding specification. We would recommend that an organisation like the C.W.P.C. could initiate collaboration amongst the purchasers in order to reach an agreement regarding the general acceptance of Indian Standard Specifications.

11. Power and distribution transformers up to 50,000 KVA and 220 KV on the H.T. side are assessed to protective duty under Item No. 72(39) of the First Schedule to the Indian Tariff Act, 1934, the relevant extract from which is reproduced below :—

S. No.	Name of article	Nature of duty	Standard rate of duty	Preferential rate of duty if the article is the produce or manufacture of			Duration of protective rate of duty
				The United Kingdom	A British Colony	Burma	
72 (39)	Power and Distribution Transformers up to 50,000 KVA and 220 KV on the H. T. side (primary voltage being over 250) excluding furnace, rectifier and flame proof transformers and parts of such transformers, not otherwise specified.	Protective	10 per cent <i>ad velorum</i>	..	..	..	December 31st, 1965

NOTES.—(i) Under the Finance Act, 1963 a general surcharge of 10 per cent has been added on all import duties and the surcharge has been continued.

(ii) From February 1965, a regulatory customs duty of 10 per cent of the value of imports has been imposed and the same is proposed to be continued under the Finance Bill, 1965.

12.1. *Import control policy.*—For the purpose of import control policy, power and distribution transformers are classified under Serial No. 42(a) and (d) of Part II of the Import Trade Control Schedule. The licensing policy commencing from April 1963—March 1964 onwards is given below :—

During the period April 1963—March 1964, no licences were granted to established importers for import of transformers of any ratings. However, actual users' applications were considered by the Chief Controller of Imports for import of transformers of ratings higher than 1,500 KVA and 22 KV on the H.T. side. The same policy was continued during the subsequent licensing period April 1964—March 1965.

12.2. *Imports.*—The Director General of Commercial Intelligence and Statistics, Calcutta, has started publishing since April 1964 imports of power and distribution transformers only by numbers and value according to the classification recommended by us in our last Report. However, he has been reporting to us, the total KVA also in addition to numbers and value in respect of transformers up to 50,000 KVA and 220 KV on the H.T. side. The table given below shows the import of transformers during the last two years:—

Year	As published in the Monthly Statistics of Foreign Trade of India		As reported to the Commission by the D. G. C. I. & S. on the lines of its recommendation	
	Nos.	KVA Value (Rs. in lakhs)	Nos.	KVA* Value (Rs. in lakhs)
1963	2784	N.A. 315.07	167	943,040 20.60
1964	2242	N.A. 325.19	144	506,848 77.12

*Figures in this column are reported to be incomplete.

The two sets of figures differ widely both in respect of numbers and value. It may be on account of the fact that published data include welding and instrument transformers in addition to power and distribution transformers. Besides, the data reported to us by the D.G.C.I. & S. cover imports of transformers up to 50,000 KVA and 220 KV only and thus imports above those ratings are excluded. Thus, it does not seem to be possible to reconcile the two sets of figures. Further, the value figure for 1963 appears to be erroneous. However, detailed break-up of these two sets of figures according to voltage and ratings are given in Appendix V.

13. The performance of the Indian industry in the sphere of exports does not appear to be satisfactory.

13. Exports There has been considerable decline in exports since 1962. From an export of 16 transformers in 1962 it declined to 8 in 1963 and to just one in 1964. The main limiting factor seems to be the cost of production which is largely governed by imported raw materials and components constituting nearly 60 per cent of the entire raw material requirements in the manufacture of transformers. It is said that the prices of transformers quoted in foreign countries do not even cover the cost of raw materials in India. Some of the manufacturers have pointed out that our designs are not much advanced technologically and our production is not sufficiently of a large scale to reduce cost. In the case of distribution transformers it is said that the prices of European manufacturers are very low and it would be difficult to compete with them, but as regards power transformers

it is said that the prices of Indian manufacturers are competitive. Still it will be difficult to export our products in the absence of after sales service facilities outside India. The I.E.M.A. has pointed out that since transformers form only part of complete project schemes it would be difficult to export them unless tenders for complete projects could be submitted by a consortium. This issue was discussed at the public inquiry and we were happy to learn that the producers in Madras are contemplating a consortium for the purpose of exporting transformers along with other electrical equipment. It would be desirable indeed if this is emulated by producers in the other regions of India. However, the importance of effecting economies in the cost of production for encouraging exports cannot be gainsaid. Raw materials should be made available to the producers at as low a price as possible. It is suggested by one of the producers that copper should be made available to them at producer prices which are at least 50 per cent lower than the London Metal Exchange price. The material could be processed in India before being used for the transformer industry. Similarly, it has been suggested that laminations and other raw materials should also be made available if possible at international prices. It has also been suggested that import entitlement should be raised from 40 per cent on F.O.B. value to 75 per cent. We recommend that Government may examine these suggestions for improving exports.

14.1. *Selling system*.—Sales and stocks during the years 1963 and 1964 pertaining to eighteen producers is as follows:—

Year	Sales during		Stocks at the end of	
	Nos.	KVA	Nos.	KVA
1963	13,897	2,595,102	1,414	240,290
1964	15,487	3,241,111	1,189	294,038

It may be noticed from the above table that sales increased in 1964 by 14.44 per cent in terms of numbers and by 25 per cent in terms of KVA as compared to 1963. Stocks at the end of 1964 came down by 16 per cent in terms of numbers even though in terms of KVA they have increased by 22 per cent in comparison with those of 1963.

14.2. Purchasers and transformers are mainly Electricity Boards and public electricity supply undertakings and the transformers are manufactured according to their individual needs. Sales are also effected generally directly by the producers against tenders invited by them or through the D.G.S. & D. Some of the producers no doubt make sales through sole selling agents or their distributors. But such sales are few and far between. Whatever the system of sales it seems to be working satisfactorily and there has not been any serious complaint from the consumers about the selling arrangements.

14.3. Delivery periods, however, still seem to be long varying from four months in certain cases to as much as three years in others depending upon the ratings and sizes. Most of the producers admit that they do receive complaints from customers regarding long delivery periods. They are, however, attributed to the protracted supply and sometimes even non-availability of raw materials. It is admitted by some of the producers that the long delivery periods may also be due to their limited manufacturing capacity and they suggested that the projected expansion of manufacturing units should be allowed to proceed according to schedule. It is in the interest of the electricity system of the country that avoidable delays in the supply of transformers should be minimised as far as possible if not completely eliminated. The delays in the allocation of foreign exchange to projects and the issue of import licences must be minimised. Very often the irregular supply of raw materials is attributed to the delay in securing import licence. A considerable part of the avoidable delay appears also to be due to the lack of planning of the purchases by the Electricity Boards. If only they were to plan their requirements in advance and place orders the producers would have an even manufacturing load throughout the year which should eliminate congestion of work and reduce time required for delivery.

14.4. The consumers are unanimous in complaining that delivery periods are generally long particularly in the case of higher ratings. It has also been pointed out that the manufacturers are unable to keep up to the schedule of even long periods quoted by them and they ask for extension of time. This adversely affects the progress of normal developmental works and electrification schemes. The time taken to produce and deliver a transformer is a function of two variables, namely, the steadiness of demand and regularity in the supply of raw materials and components. While some uncertainties persist in respect of raw material supply, as a major part of it has to be imported, there should not be the same difficulty in the case of planning the requirements of institutional buyers like the State Electricity Boards. Therefore, there is scope for immediate reduction of delivery periods provided the planning of purchases by the Electricity Boards is well organised foreseeing their requirements in advance according to the schemes approved and waiting for implementation by them.

14.5. Almost all the producers maintain efficient after sales service departments consisting of experienced engineers and erectors to rectify the defects and advise in the matter of installation and maintenance of transformers. Some of the producers inspect the transformers after commissioning and render technical advice to the consumers.

14.6. *Selling prices.*

14.6.1. So far as transformers are concerned there could be no fixed price list as they are not standardised products. Prices of transformers would vary with the design, voltage ratio, losses, fittings etc. Still as principal consumers call for tenders there exists some competition amongst the producers in offering their quotations. In spite

of this special feature a few of the producers have their published price lists. The prices are not, however, comparable as they pertain to transformers of different specifications.

14.6.2. We recommended in our last Report that producers should offer lower prices for transformers of standard specifications as compared to those deviating from such standards. A few of the producers seem to be offering lower prices for standard type transformers while others have not yet started the practice of offering lower prices for such types. The recommendation was made by us with the expectation that such an incentive might lead to greater standardisation in production as a result of the buyers making their requirements conform to a standard type. But it is unfortunate that even where such incentives are offered the impact on the buyers has been poor. As long as orders deviate from standards the producers will be unable to reduce prices or delivery periods.

14.6.3. We had recommended in our last Report that the prices of transformers should be brought down by the producers but the producers have represented their difficulties in any attempt to reduce the cost of production. It is said that so long as cost of raw materials and labour are high any rationalisation of production is difficult. In view of the varied requirements of the buyers cost reduction would be beyond their power. As indicated already some at least of these difficulties are not insurmountable. The producers should be helped in streamlining their methods of production by regularising the demand. As regards raw materials' costs we recommend that early steps should be taken by Government for the substitution of indigenous materials for imports in all spheres where opportunities exist within the country. Production of electric sheet steel to meet the requirements of the industry in the existing steel plants within the country should not be a formidable difficulty. We also recommend that the production of CRGO sheets during the Fourth Plan period in preference to hot rolled sheets programmed for production at the Rourkela plant of the Hindustan Steel Ltd. should be explored.

14.6.4. The consumers have stated that they have standardised their requirements of transformers particularly of low ratings but nevertheless we notice that the KVA ratings of transformers purchased by them even in the lower ratings below 100 KVA are not the preferred ratings specified in IS-1180-1964 and in the higher ratings covered by IS-2026. It needs no emphasis to state that it is in the interest of consumers to make their requirements conform to the preferred ratings.

15.1. For the purpose of determining the cost of production of indigenous power and distribution transformers, three units, viz., National Electrical Industries Ltd., Bombay, Hackbridge-Hewitt & Easun Ltd., Madras and Associated Electrical Industries Manufacturing Co. (P) Ltd., Calcutta were selected for cost investigation. Our Cost Accounts Officers have examined the costs of production of transformers manufactured by these three units for the

15. Estimates of costs of production and fair ex-works prices.

latest accounting periods for which figures were available. The types of transformers that have been costed in detail are fairly representative of the pattern of production and cover the major part of the output of the respective units. The reports of our Cost Accounts Officers are forwarded separately as confidential enclosures to this Report.

15.2. We have discussed the costs with the representatives of the respective units except Associated Electrical Industries. Based on the actual costs as reported by the Cost Accounts Officers and the subsequent discussions, we have framed our estimates of fair ex-works prices for future for the representative types of transformers produced by the three units. It may be mentioned here that since transformers are generally made to suit the particular requirements of a customer, usually costs of transformers of identical capacity and input/output voltages are not strictly comparable with each other. This fact has to be borne in mind while comparing the fair ex-works prices with the landed cost of imported transformers as also the cost of the different indigenous producers *inter se*. Our estimates of fair-ex-works prices for those types of transformers for which comparable c.i.f. prices were available (subject to the limitations mentioned above) are shown in the statement on next page.

15.3. In estimating the fair ex-works prices for future, we have taken into consideration the increased volume of production as envisaged by us after the discussion with the units during the next three years. The pattern of production has been assumed to be the same as in the costed period. The consumption of various raw materials has been taken on the basis of material specifications as adopted for the actual period, which has been valued at the latest available rates. Suitable provision has also been made for the effect of the additional levies in the Finance Bill, 1965 where necessary. One of the units maintained cost records to show reasonable allocations of all items of expenses to the products. The other two units, however, did not maintain any such records except for the raw materials. The expenses for these two units have, therefore, been allotted to the products on suitable bases taking all factors into consideration. Anticipated increase in labour and establishment charges on account of fresh agreement with labour union, any additional complement required for assumed expansion of activity, normal annual increments, etc. have been taken into account. Other items of expenses including overheads have been estimated similarly taking into consideration the merits of each case. Depreciation has been calculated on net fixed assets at normal income-tax rates including shift allowances where applicable. In calculating the net fixed assets account has been taken of the planned additions mostly in the nature of balancing equipments required for the increased production. Return has been allowed at 12 per cent on capital employed comprising average net fixed assets and working capital assessed at an amount equivalent to four months' cost of production excluding depreciation.

15.4. The fair ex-works prices have been estimated only for the purpose of ascertaining the quantum of protection necessary *vis-a-vis* the imported transformers. Such prices should not, therefore, be considered as representative selling prices for which other factors have also to be taken into consideration.

16. We had called for information regarding c.i.f./f.o.b. prices of power and distribution transformers from the Collectors of Customs and the Government of India Trade Representatives in certain foreign countries. From the information received in this behalf, it was found that except for quotations furnished by the High Commission of India in U.K. and G.E.C., Calcutta none other included any item comparable to the types of power and distribution transformers for which costs were ascertained. Some c. & f. quotations were for sales to countries other than India. It may be stated, however, that the quotations received for transformers manufactured in countries other than U.K. particularly the continent and Japan appear to be much lower than those of indigenous or British origin. However, the input-output ratio and the KVA ratings thereof did not agree with those of Indian products and hence no comparison is possible. After examining the various data furnished to us as also the sources of supply of transformers, we have decided to adopt c.i.f. prices of British transformers received from the High Commission of India in U.K. for comparison with the domestic fair ex-works prices.

17. The following statement gives the comparison between the fair ex-works prices of domestic transformers with the landed costs without duty of transformers of U.K. origin. The statement also shows a comparison with landed cost including regulatory duty but excluding other tariffs. However, since the regulatory duty is levied on almost all commodities and further its continuance is uncertain, we have left it out of account while determining the measure of protection to the industry.

17. Comparison of estimated fair ex-works prices of indigenous transformers with landed costs without duty of imported transformers.

Statement showing the comparison of landed costs without duty of Transformers (if imported) with fair ex-works prices of indigenous Transformers

	25 KVA		75 KVA		100 KVA		250 KVA		500 KVA		1000 KVA		2500 KVA		5000 KVA		10000 KVA	
	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit B	Unit A	Unit A	Unit A
1	2	3	4	5	6	7	8	9	10	11	12	13	14					
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1. Ex-works price	2625.93	6898.46	4734.13	5882.56	13074.07	20411.62	18613.50	38590.05	57833.73	69576.80	110376.16	151275.62	224581.36					
2. C.i.f. price.	4200.00	6000.00	6000.00	6533.00	9467.00	13867.00	13867.00	33600.00	54000.00	65333.00	109333.00	153333.00	213333.00					
3. Customs duty :																		
(i) Tariff excluding re- gulatory duty	462.00	660.00	660.00	718.63	1041.37	1525.37	1525.37	3596.00	5940.00	7186.63	12026.63	16866.63	23466.63					
(ii) Regulatory duty	420.00	600.00	600.00	653.30	946.70	1386.70	1386.70	336.00	5400.00	6533.30	10933.30	15333.30	21333.30					
4. Clearing charges (1%)	42.00	60.00	60.00	65.33	94.67	138.67	138.67	336.00	540.00	653.33	1093.33	1533.33	2133.33					
5. Landed cost	5124.00	7320.00	7320.00	7970.26	11549.74	16917.74	16917.74	40992.00	65880.00	79706.26	133386.26	187066.26	260266.26					
6. Landed cost including regulatory duty but excluding other tariffs	4662.00	6660.00	6660.00	7251.63	10508.37	15392.37	15392.37	37296.00	59940.00	72519.63	121359.63	170199.63	236799.63					
7. Landed cost without duty	4242.00	6050.00	6060.00	6598.33	9561.67	14005.67	14005.67	33936.00	54540.00	65986.33	110426.33	154866.33	215466.33					
8. Difference between ex- works price and lan- ded cost inclu ding regulatory duty but excluding other tariffs	(-)2036.07	238.46	(-)1925.87	(-)1369.07	2565.70	5019.25	3221.13	1294.05	(-)2106.27	(-)2942.83	(-)10983.47	(-)18924.01	(-)12218.27					
9. (8) as a percentage of c.i.f. price (2)	(-)48.48	3.97	(-)32.10	(-)20.96	27.10	36.20	23.23	3.85	(-)33.90	(-)4.50	(-)10.05	(-)12.34	(-)5.73					
10. Difference between ex- works price and landed cost with out duty	(-)1616.07	838.46	(-)1325.87	(-)715.77	3512.40	6405.95	4607.83	4654.05	3293.73	3590.47	(-)50.17	(-)3590.71	9115.03					
11. (10) as a percentage of c.i.f. price (2)	(-)38.48	13.97	(-)22.10	(-)10.96	37.10	46.20	33.23	13.85	6.10	5.50	(-)0.05	(-)2.34	4.27					

18.1. The I.E.M.A. desired the continuance of protection beyond 31st December 1965. Most of the producers have also individually desired to have the benefit of protection for a further period for the implementation of their expansion schemes. They have urged that the industry is still to develop considerably if costs of production have to be brought down which they admit are still high owing to the necessity to import a considerable part of their raw material requirements. They have also pleaded for other assistance in the form of regular and smooth supply of raw materials, reduction of import duty on raw materials, standardisation of ratings, voltage ratio and strict adherence to agreed standard specification. We generally agree with these suggestions.

18.2. Most of the consumers, importers and the D.G.T.D. have stated that the protection should be continued beyond the end of December 1965 on the ground that the indigenous industry is still in a developmental stage and cannot, therefore, withstand uncontrolled competition from foreign countries. A few of the consumers have suggested that the continuance of protection should be conditional on the improvement of delivery periods. As already indicated by us delivery periods are contingent on the standardisation of demand and de-protection could be of no avail in its improvement. One Government department has put forward the view that as long as foreign exchange shortages and consequent import restrictions exist there is hardly any necessity for continuance of protection. At the public inquiry the representative of the I.E.M.A. indicated with justification that though such fortuitous circumstances as shortage of foreign exchange and import restrictions may incidentally offer a measure of protection, they cannot take the place of statutory tariff protection which not only assures deliberate fostering of the industry to the extent required but also offers an opportunity for a periodic review of the problems of the industry and the recommendation of measures by the Commission to the concerned authorities for dealing with them. In view of these special features, the I.E.M.A. pleaded for continuance of tariff protection beyond the end of December 1965.

18.3. The comparison of the fair ex-works prices of indigenous transformers with the landed costs ex-duty of the corresponding imported transformers given in paragraph 17 indicates that the position of the domestic industry varies from an advantage of 38.48 per cent to a disadvantage of 46.20 per cent. This comparison is subject to the limitation mentioned in paragraph 15.2. We have adopted c.i.f. prices of British transformers for comparison because U.K. is one of the largest suppliers of transformers to India. We cannot at the same time ignore the fact that although the c.i.f. prices of comparable types and varieties are not available, the Continental and Japanese transformers are much cheaper than those of U.K. It was brought to our notice at the public inquiry that prices of Continental transformers quoted to certain electricity undertakings in India were about 50 per cent lower than the prices of domestic transformers. In view of these facts and

having regard to the various handicaps of the industry discussed earlier, we consider that the industry needs continuance of protection for a further period. We accordingly recommend that the existing protective duty of 10 per cent *ad valorem* on transformers upto 50,000 KVA and 220 KV on the H.T. side and parts of such transformers, not otherwise specified, covered by I.C.T. item No. 72(39) should be continued for a three year period, *i.e.*, till 31st December 1968. This is exclusive of the regulatory customs duty as well as the surcharge.

19. Our conclusions and recommendations are summarised below :
 Summary of conclusions and recommendations.

(i) The domestic demand for power and distribution transformers is estimated at 8.25 million KVA in 1965-66, 12.87 million KVA in 1966-67, 13.20 million KVA in 1967-68 and 12.32 million KVA in 1968-69.

(Paragraph 8.3.6)

(ii) As the level of production of laminations and consequent production of transformers would depend entirely on the availability of electrical steel sheets, larger allocation of foreign exchange for import is imperative for the future development of the industry.

(Paragraph 9.2.1.4)

(iii) The Indian Electrical Manufacturers' Association has pleaded for a substantial increase in the allocation of copper to the wire manufacturers. It has also desired the Government to enter into an agreement with the producer country directly, if possible. This may be examined by Government.

(Paragraph 9.2.2.3)

(iv) It is necessary for indigenous manufacturers to keep abreast of developments in other countries and to undertake research and development themselves.

(Paragraph 9.2.2.5)

(v) Dimensional standardisation of bushings above 11 KV should be completed expeditiously with the concurrence of the principal transformer users so that the bushing manufacturers will have no difficulty in adopting the ISI specifications.

(Paragraph 9.2.3.1)

(vi) It would be advisable to include the production of steel strips in 16 SWG also in the future production programme of the Rourkela Steel Works.

(Paragraph 9.2.4.3)

(vii) The possibility of manufacture of seam welded radiators indigenously may be explored by the Directorate General of Technical Development.

(Paragraph 9.2.4.4)

(viii) As the transformer manufacturers are finding it difficult to procure M.S. plates and sections from indigenous sources, we reiterate our recommendation made in the 1963 Report that high priority ought to be given to the transformer industry in the allocation of M.S. steel plates.

(Paragraph 9.2.5)

(ix) The Development Commissioner, Small Scale Industries, should, in consultation with the D.G.T.D., evolve a suitable arrangement for meeting the reasonable raw material requirements of the small scale units.

(Paragraph 9.2.9)

(x) The adoption of ISI standards by the manufacturers of transformers and of components would remove the various shortcomings that are being found owing to the multiplicity of designs in use in the country. The State Electricity Boards should therefore adhere to the ISI standards in placing their orders with the producers for their future requirements of transformers.

(Paragraph 10.2.2)

(xi) In order to unify the requirements of various users, an organisation like the Central Water & Power Commission could initiate collaboration amongst the purchasers of transformers to reach an agreement regarding the general acceptance of Indian Standard Specifications.

(Paragraph 10.2.4)

(xii) Government may examine the various suggestions made by the transformer industry and referred to in paragraph 13 for improving exports.

(Paragraph 13)

(xiii) The delays in the allocation of foreign exchange to expansion projects of transformer manufacturers and the issue of import licences must be minimised.

(Paragraph 14.3)

(xiv) There is scope for immediate reduction of delivery periods provided the planning of purchases by the Electricity Boards is well organised foreseeing their requirements of transformers in advance according to the schemes approved and awaiting implementation by them.

(Paragraph 14.4)

(xv) Early steps should be taken by Government for the substitution of indigenous materials for imports in all spheres where opportunities exist within the country. The production of CRGO sheets during the Fourth Plan period in preference to hot rolled sheets programmed for production at Rourkela plant of Hindustan Steel Ltd. should be explored.

(Paragraph 14.6.3)

(xvi) Protection to the transformer industry should be continued for a further period of three years ending 31st December 1968 at the existing duty of 10 per cent *ad valorem* on transformers upto 50,000 KVA and 220 KV on the H.T. side and parts of such transformers, not otherwise specified, falling under I. C. T. item No. 72(39). This is exclusive of the regulatory customs duty as well as the surcharge.

(Paragraph 18.3)

20. We wish to convey our thanks to the manufacturers and their Association, the importers and consumers of transformers and suppliers of raw materials who furnished us with detailed information in connection with this inquiry and to their representatives who gave evidence before us.

Acknowledgements


M. P. PAI,
Chairman.

R. BALAKRISHNA,
Member.

B. G. GHATE,
Member.

M. ZAHEER,
Member.

PRAMOD SINGH,
Secretary.

BOMBAY, dated 27th April, 1965.  *मेव जयते*



सत्यमेव जयते

APPENDIX I

(Vide Paragraph 3.1)

List of those to whom questionnaires and letters were issued and from whom replies were received

*Indicates those who furnished information in reply.

@Indicates those who had no information to furnish in reply.

PRODUCERS

- *1. National Electrical Industries Ltd. The Industrial Estate, Lalbaug, Bombay-12.
- *2. Crompton Parkinson (Works) Ltd., Dr. E. Moses Road, Worli, Bombay-18.
- *3. Bharat Bijlee Ltd., Udyog Nagar, Near King's Circle Rly. Station, Bombay-1.
- *4. Bajaj Electricals Ltd., 45-47, Veer Nariman Road, Bombay-1.
- *5. Emco-Transformers (P) Ltd., Ahoora Mahal, 2nd Floor, 93, Marine Drive, Bombay-2.
- *6. Associated Electrical Industries Mfg., Co. (P) Ltd. 1, Taratalla Road, Garden Reach, Calcutta-24.
- *7. The General Electric Co. of India Pvt. Ltd., Magnet House, 6, Chittaranjan Avenue, Calcutta-13.
- *8. Electric Construction & Equipment Co. 9, Kaliprasanna Singhee Road, Calcutta-2.
- @9. The India Electric Works Ltd., Diamond Harbour Road, Behala, Calcutta-34.
- *10. Hackbridge-Hewitt & Easun Ltd., 5-7, Second Line Beach, Madras-1.
- *11. Transformer & Switchgear Ltd., Indian Chamber Buildings, Esplanade, Madras-1.
- *12. Radio and Electricals Ltd., 8/1, Victoria Crescent Road, Madras-8.
- *13. Kirloskar Electric Co. Ltd., Post Box No. 1017, Mallaswaram, Bangalore-3.
- *14. Government Electric Factory, Post Box No. 579, Mysore Road, Bangalore-2.
- *15. Indian Transformers Ltd., Post O. Box No. 21, Alwaye, Kerala.
- *16. Pradip Lamp Works, Jay Krishna Road, Patna-9.
- *17. The Hindustan Electric Co. Ltd., Thackersey House, Graham Road, Ballard Estate, Bombay-1.
- *18. Andhra Pradesh Electrical Equipment Corporation, (Prop. Electric Construction & Equipment Co.) 9, Kaliprasanna Singhee Road, Calcutta-2.
- *19. Heavy Electricals (India) Ltd., Govindpura, Post Box No. 46, Bhopal.

PRODUCERS' ASSOCIATION :

*Indian Electrical Mfrs. Association, India Exchange (7th Floor), Calcutta-1.

I. PROSPECTIVE PRODUCERS

- *1. Transformers and Electrical Kerala Ltd., 7792-Chittoor Road, Ernakulam-8.
- *2. Siemens Engineering & Mfg., Co. of India Ltd. Stadium House, Veer Nariman Road, Bombay-1.
- 3. Bihar State Industrial Development Corporation, Patna.
- 4. Beegee Corporation (P) Ltd., Patiala.
- *5. The New Government Electric Factory, Post Box No. 84. Bangalore-1.

IV. IMPORTERS :

1. International General Electric Co. (India) Ltd., Thackersey House, Graham Road, Ballard Estate, Bombay-1.
- *2. The General Electric Co. of India Private Ltd., Magnet House, 6, Chittaranjan Avenue, Calcutta-13.
3. The English Electric Co. of India Ltd., Post Box No. 752, Bombay-1.
4. Easun Engineering Co. Ltd., 2nd Line Beach, Madras.
5. Associated Electrical Industries (India) Ltd., Crown House, Mission Row, Calcutta.
- *6. Voltas Ltd. (Electrical Division), 19, Graham Road, Ballard Estate, Bombay-1.
- *7. Dodsai Pvt. Ltd., Mafatlal House, Backbay Reclamation, Bombay-1.
- @8. Hawker Siddley International (India) Ltd., 1st Floor, Mehta House, Post Box No. 1886, Bombay-1.
- @9. J. B. Advani-Orlikon Electrodes (P) Ltd., Redia House, 6, Rampart Road, Bombay-1.

V. CONSUMERS :

1. The Federation of Electricity Undertakings of India, Killick House, Home Street, Fort, Bombay-1.
- *2. The Calcutta Electric Supply Corporation Ltd., Victoria House, Charinghee Square, Calcutta-1.
- *3. Electricity Supply Undertakings, Managing Agents, Martin Burn Ltd., 12, Mission Row, Calcutta.
- *4. The Association of Electricity Supply Companies, Uttar Pradesh, C/o., Martin Burn Ltd., 12, Mission Row, Calcutta-1.
5. The Association of Electricity Undertakings, Bengal, Victoria House, Calcutta.
- *6. The South Madras Electric Supply Corporation Ltd., Power House, Tennur, Tiruchinappalli-1 (S. India).
- *7. Madhya Pradesh Electricity Board, Rampur, Jabalpur.
- *8. Mysore State Electricity Board, Office of the Chief Engineer, Electricity, Post Box No. 315, Bangalore-1.
9. Kerala State Electricity Board, Post Box No. 65, Trivandrum.
- *10. Chief Engineer, Electricity, Government of Orissa, Orissa State Electricity Board, Bhubaneswar.
- *11. The Chief Engineer, Maharashtra State Electricity Board, Mercantile Bank Building, Mahatma Gandhi Road, Bombay-1.
- *12. The Kanpur Electricity supply Administration, U. P. State Electricity Board, Electricity House, P. B. No. 54, Kanpur.
- *13. Damodar Valley Corporation, Anderson House, Alipore, Calcutta-27.
- *14. The Tata Hydro-Electric Power Supply Co. Ltd., Bombay House, Bruce Street, Bombay-1.
- *15. B. E. S. T. Undertaking, Best House, Post Box No. 192, Bombay-1.
- *16. The Superintending Engineer, Technical (Electrical), Madras State Electricity Board, 157, Mount Road, Madras-2.
17. The Chief Engineer, Andhra Pradesh State Electricity Board, Khairabad, Hyderabad (Andhra Pradesh).
- @18. The Superintending Engineer, Hydrel Ganga Circle, Roorkee.
- *19. The Chief Engineer, Punjab State Electricity Board, Project Section, Patiala.
- *20. Killick Industries Ltd., P. B. No. 109, Home Street, Bombay-1.

- *21. Octavius Steel and Co., P. B. No. 39, Calcutta-1.
- *22. Assam State Electricity Board, Shillong.
- *23. West Bengal State Electricity Board, New Secretariat Buildings, 1, Hastings Street, Calcutta-1.
- *24. The Gujarat Electricity Board, Race Course, **Baroda**.
- *25. Neyveli Lignite Corporation, Neyveli.

VI. RAW MATERIAL SUPPLIERS :

- *1. Devidayal Stainless Steel Industries Pvt. Ltd., Darukhana, Reay Road, Bombay-10.
- *2. Guest, Keen, Willims Ltd., Sankey Division, Wakefield House, Sprott Road, Bullard Estate, Bombay-1.
- *3. Government Porcelain Factory, Post Box No. 1, Bangalore-12.
- *4. Bengal Potteries Ltd., 3, Pagladanga Road, Calcutta-10.
- *5. Bengal Porcelain Co. Ltd., 1/2, Motisil Street, Calcutta-13.
- *6. Hindustan Potteries, 12, Shib Kristo Daw Lane, Calcutta-7.
- *7. Premier Automobiles Ltd., Agra Road, Kurla, Bombay-70.
- *8. Tube Products of India, Avadi, Madras-54.
- *9. The Indian Tube Co. (1953) Ltd., 41, Chowringhee Road, Calcutta-16.
- *10. National Insulated Cable Co. of India Ltd., Nicco House, 2, Hare Street, Calcutta-1.
- *11. The Indian Cable Co. Ltd., 9, Hare Street, Calcutta-1.
- *12. Devidayal Cable Industries Ltd., Darukhana, Reay Road, Bombay-10.
- *13. Shakti Insulated Wires Pvt. Ltd., B. Motilal Mansion, 22, Apollo Street, Bombay-1.
- @14. Seshasayee Industries, Serakuppam, Vadalur, South Arcot, Madras.

VII. CENTRAL GOVERNMENT DEPARTMENTS

- *1. The Director General, Directorate General of **Technical Development**, Ministry of Industry & Supply, Udyog Bhavan, New Delhi.
- *2. The Secretary to the Government of India, **Ministry of Commerce**, New Delhi.
- *3. The Secretary to the Government of India, **Ministry of Steel and Heavy Industries**, New Delhi.
- *4. The Secretary to the Government of India, **Ministry of Petroleum and Chemicals**, New Delhi.
- *5. The Development Commissioner, Small Scale Industries, Udyog Bhavan, New Delhi.
- *6. The Director, Indian Standards Institution, **Manak Bhavan**, 9, Bahadur Shah Zafer Marg, New Delhi-1.
- *7. Member (Utilization), Central Water and **Power Commission**, (Power Wing) Bikaner House, Shahjahan Road, New **Delhi**.
- *8. The Collector of Customs, Bombay.
- *9. The Collector of Customs, Calcutta.
- *10. The Collector of Customs, Madras.
- *11. The Collector of Customs, Cochin.
- *12. The Director General of Commercial Intelligence **and Statistics**, 1, Council House Street, Calcutta-1.
- *13. The Secretary, Engineering Export Promotion **Council**, (7th Floor), India Exchange, India Exchange Place, Calcutta-1.

- *14. The Minister (Economic), High Commission of India in U.K., India House, Aldwych, London.
- *15. The Commercial Counsellor, Embassy of India, 262, Koblenz Strasse, Bonn (W. Germany).
- 16. First Secretary (Commercial) Embassy of India, Empire House, Marunouchi, Tokyo.
- *17. First Secretary (Commercial), Embassy of India, 2107, Massachusetts Avenue, Washington-8, D.C.

VII. DIRECTORS OF INDUSTRIES OF STATE GOVERNMENTS

- 1. The Director of Industries, Government of Andhra Pradesh, Hyderabad.
- 2. The Director of Industries, Government of Bihar, Patna.
- *3. The Director of Industries, Government of West Bengal, Calcutta.
- *4. The Director of Industries, Government of Kerala, Trivandrum.
- 5. The Director of Industries, Government of Madhya Pradesh, Bhopal.
- 6. The Director of Industries, Government of Madras, Madras.
- *7. The Director of Industries, Government of Maharashtra, Bombay.
- *8. The Director of Industries, Government of Mysore, Bangalore.
- *9. The Director of Industries, Government of Punjab, Chandigarh.

IX. CHIEF SECRETARIES OF STATES

- 1. The Chief Secretary to the Government of Andhra Pradesh, Hyderabad.
- 2. The Chief Secretary to the Government of Assam, Shillong.
- 3. The Chief Secretary to the Government of Bihar, Patna.
- 4. The Chief Secretary to the Government of West Bengal, Calcutta.
- *5. The Chief Secretary to the Government of Gujarat, Ahmedabad.
- 6. The Chief Secretary to the Government of Jammu and Kashmir, Srinagar.
- 7. The Chief Secretary to the Government of Kerala, Trivandrum.
- *8. The Chief Secretary to the Government of Madhya Pradesh, Bhopal.
- 9. The Chief Secretary to the Government of Madras, Madras.
- 10. The Chief Secretary to the Government of Maharashtra, Bombay.
- 11. The Chief Secretary to the Government of Mysore, Bangalore.
- 12. The Chief Secretary of the Government of Orissa, Bhubaneswar.
- *13. The Chief Secretary to the Government of Punjab, Chandigarh.
- 14. The Chief Secretary to the Government of Rajasthan, Jaipur.
- *15. The Chief Secretary to the Government of Uttar Pradesh, Lucknow.
- *16. The Chief Commissioner, Delhi Administration, Delhi.
- *17. The Chief Commissioner, Himachal Pradesh, Simla.

APPENDIX II

(Vide paragraph 3.1)

Statement showing the factories visited by the Commission and other Officers

Sl. No.	Name of the factory	By whom visited	Date of visit
1	2	3	4
1	Kirloskar Electric Co. Ltd., Bangalore	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member (iv) Shri N. Das, Technical Director (E. & M.)	10-2-65 18-11-64 6-4-65 10-11-64
2	Government Electric Factory, Bangalore	(i) Dr. R. Balakrishna, Member (ii) Shri M. Zaheer, Member (iii) Shri N. Das, T. D. (E. & M.)	11-11-64 6-4-65 10-11-64
3	Government Porcelain Factory, Bangalore	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member (iv) Shri N. Das, T. D. (E. & M.)	11-2-65 12-11-64 4-4-65 12-11-64
4	Guest, Keen, Williams Ltd., (Sankey Division), Bangalore	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member (iv) Shri N. Das, T. D. (E. & M.)	10-2-65 17-11-64 6-4-65 9-11-64

1	2	3	4
5	Radio and Electricals Mfg. Co., Madras	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member	8-2-65 16-11-64 8-4-65
6	Hackbridge—Hewitt & Easun Ltd., Madras	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member (iv) Shri N. Das, T. D. (E. & M.) (v) Shri S. R. Mallya, C.A.O.	9-2-65 7-8-64 8-4-65 15 & 16-11-64 5-12-64 to 9-12-64
7	Transformer & Switchgear Ltd., Madras	(i) Chairman (ii) Dr. R. Balakrishna, Member (iii) Shri M. Zaheer, Member (iv) Shri N. Das, T. D. (E. & M.)	9-3-65 8-8-64 10-4-65 13-11-64
8	Associated Electrical Industries Mfg. Co. Pvt. Ltd., Calcutta.	(i) Dr. R. Balakrishna, Member (ii) Shri S. R. Mallya, C.A.O.	24-9-64 30-12-64 to 6-1-65
9	Calcutta Electrical and Mechanical Engineers (P) Ltd., Calcutta (Small-Scale Unit).	Dr. P. V. Gunishastri, Director (Reviews & Research).	19-12-64
10	National Electrical Industries Ltd., Bombay	Shri A. T. Mukherji, A.C.A.O.	19-10-64

APPENDIX III
(Vide paragraph 3:3)

List of persons who attended the Commissions Public inquiry on
30-3-1965

Sl. No.	Name of the Representative	Name of firm/body represented
1	2	3
I. PRODUCERS		
1	Shri R. L. Kirloskar	Kirloskar Electric Co. Ltd., Post Box No. 1017, Malleswaram, Bangalore-3.
2	„ F. Haque	Heavy Electricals (India) Ltd., Govindpura, Post Box No. 46, Bhopal.
3	„ S. Nagarajan	Hackbridge-Hewittic & Easun Ltd., 5-7 Second Line Beach, Madras-1.
4	„ S. Suryanarayan	
5	„ Dharap	
6	„ M. T. Gursahaney	National Electrical Industries Ltd., The Industrial Estate, Lalbaug, Bombay-12.
7	„ U. Singh	
8	„ B. B. Bhatnagar	Associated Electrical Industries Mfg. Co. Pvt. Ltd., 1, Taratalla Road, Garden Reach, Calcutta-24.
9	„ S. Szafranski	The General Electric Co. of India Pvt. Ltd., Magnet House, 6, Chittaranjan Avenue, Calcutta-13.
10	„ R. S. Mamak	
11	„ D. S. Doshi	Bajaj Electricals Ltd., 45-47, Veer-Nariman Road, Bombay-1.
12	„ A. R. Salvi	Bharat Bijlee Ltd., Udyog Nagar, Near King's Circle Rly. Station, Bombay-22.
13	„ R. W. Pradhan	
14	„ D. P. Basava Raj	Government Electric Factory, Post Box No. 579, Mysore Road, Bangalore-2.
15	„ M. L. Lakhotia	Electric Construction & Equipment Co., 9, Kaliprasanna Singhee Road, Calcutta-2.
16	„ L. P. Shah	
17	„ C. J. Bhat	The Hindustan Electric Co. Ltd., Thackersey House, Graham Road, Ballard Estate, Bombay-1.
18	„ U. I. Patel	
19	„ M. Narayana Moorthy	Transformer & Switchgear Ltd., Indian Chamber Buildings, Esplanade, Madras-1.
20	„ V. D. Desai	Crompton Parkinson (Works) Pvt. Ltd., Dr. E. Moses Road, Worli, Bombay-18.
21	„ M. A. Pandit	
22	„ S. K. Mohile	
23	„ P. R. Deshpande	
24	„ B. S. Pradhan	
25	„ V. V. Dhume	

1	2	3
26	Shri G. D. Gandhi . . .	Emco Transformers Pvt. Ltd., Ahoora Mahal, 2nd Floor, 93, Marine Drive, Bombay-1.
27	„ S. P. Mathur . . .	Siemens Engineering & Mfg. Co. of India Ltd., Stadium House, Veer Nariman Road, Bombay-1.
28	„ M. L. Gauba . . .	{ Radio & Electricals Ltd., Victoria-Crescent Road, Madras-8. Indian Electrical Mfrs.' Association, India Exchange, (7th Floor), Calcutta-1.
29	„ J. S. Zaveri . . .	{ Indian Electrical Mfrs. Association, India Exchange, (7th Floor), Calcutta-1.
30	„ K. K. Sinha . . .	

II. RAW MATERIALS SUPPLIERS

31	Shri N. R. Banerji . . .	{ Guest, Keen, Williams Ltd., Sankey Division, Wakefield House, Sprott Road, Ballard Estate, Bombay-1.
32	„ F. R. Ladyman . . .	
33	„ L. S. Miller . . .	
34	„ U. R. Alagawadi . . .	
35	„ O. P. T. Aggarwal . . .	{ Devidayal Stainless Steel Industries Pvt. Ltd., Darukhana, Reay Road, Bombay-10.
36	„ S. C. Shah . . .	
37	„ K. K. Aggarwal . . .	Devidayal Cabel Industries P. Ltd., Darukhana, Reay Road, Bombay-10.
38	„ P. V. Joshi . . .	Government Porcelain Factory, Post Box No. 1, Bangalore-12.
39	„ C. V. Panshikar . . .	Indian Cable Co. Ltd., 9, Hare Street, Calcutta.
40	„ M. K. Zaveri . . .	{ Shakti Insulated Wires (P), Ltd., 13, Motilal Mansion, 22, Apollo-Street, Bombay-1.
41	„ H. M. Shah . . .	
42	„ T. G. Ball . . .	Tube Products of India, Avadi, Madras-54.

III. CONSUMERS

43	Shri K. Matthan . . .	{ The Federation of Electricity Undertakings of India, Killick House, Home Street, Fort, Bombay-1.
44	„ M. R. Bhatt . . .	
45	„ K. N. Rao . . .	B.E.S.T. Undertaking, Best House, Post Box No. 192, Bombay-1.
46	„ N. N. Naik . . .	Killick Industries Ltd., P. B. No. 109, Home Street, Bombay.
47	„ R. N. Mitra . . .	West Bengal State Electricity Board, Calcutta.
48	Lt. Col. J. M. Jadeja . . .	Gujarat State Electricity Board, Race Course Baroda.

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IV. IMPORTERS

- 49 Shri B. K. Mehta . . . English Electric Co. Ltd., Post Box No. 752, Bombay-1.

V. GOVERNMENT DEPARTMENTS

- 50 Dr. Vakil Ahmed, Development Officer. Directorate General of Technical Development, Udyog Bhavan, Maulana Azad Road, New Delhi.
- 51 Shri A. Shankaran, Director . Central Water & Power Commission, Ministry of Irrigation & Power, (Power Wing), New Delhi.
- 52 „ B. N. Bhattasali, Director (IMT EI) } Development Commissioner, Small Scale Industries, Udyog Bhavan, New Delhi.
- 53 „ B. L. Bansal, Assistant Director. }
- 54 „ N. K. Ramaswamy, Assistant Director. Indian Standards Institution, Manak Bhavan, 9, Bahadur Shah Zafer Marg, New Delhi.
- 55 „ J. A. Nazareth, Appraiser Collector of Customs, New Custom House, Bombay-1.
- 56 „ D. S. Godbole, Joint Director of Industries, (Tech. Development). The Director of Industries, Government of Maharashtra, Bombay.

APPENDIX IV

(Vide Paragraph 7.1)

I—Statement showing production of individual Manufacturers during 1963

Sl. No.	Name of the firm	Upto 25 KVA		Above 25—75 KVA		Above 75—250 KVA		Above 250—500 KVA		Above 500—1000 KVA		Above 1000—2000 KVA		Above 2000 KVA		Total	
		Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Kirloskar Electric Co. Ltd., Bangalore	..	..	86	5760	853	111825	99	46700	93	81400	17	26500	9	27000	1157	299185
2	Government Electric Factory, Bangalore	746	15075	283	16200	336	49800	69	32000	17	15600	..	..	..	..	1451	128675
3	Hackbridge-Hewittie and Eason Ltd., Madras	..	..	316	19775	337	40850	12	4800	32	21700	3	4300	40	216200	740	307825
4	Transformer & Switchgear Ltd., Madras	..	..	272	13600	10	1000	3	1500	4	4000	13	21000	18	71000	320	112100
5	Bajaj Electricals Ltd., Bombay	..	..	114	5700	302	46750	86	31900	..	..	..	..	..	..	502	84350
6	National Electrical Industries Ltd., Bombay	1	5	16	1075	34	6540	34	16600	18	16850	18	27200	56	315000	177	383270
7	Crompton Parkinson (Works) Pvt. Ltd., Bombay	284	5395	172	8285	216	38050	145	60200	91	76034	30	45000	33	153500	971	386464
8	Bharat Bijlee Ltd., Bombay	67	1675	451	22625	171	29600	36	16000	35	29700	19	25300	..	..	779	124900
9	Enco Transformers (P) Ltd., Bombay (Formerly Gandhi Electric Industries)	5	125	61	3515	111	16800	49	19680	18	13650	2	3000	..	..	246	56770
10	Hindustan Electric Co. (Baroda Works)	173	4325	..	..	55	7500	24	9600	21	18540	..	..	..	..	273	39965
11	Associated Electrical Industries Mfg. Co. (P) Ltd., Calcutta	..	..	..	..	26	5300	11	4900	20	16600	6	10200	14	46500	77	83500
12	Electric Construction & Equipment Co. Ltd., Calcutta	1690	41950	1195	60625	251	37050	123	54550	57	52000	8	12000	6	30000	3330	288175

13	G.E.C. of India Mfg. Ltd., Calcutta	1158	21793	206	12008	241	33000	177	84373	60	51405	14	26500	..	..	1856	229081
14	Andhra Pradesh Electrical Equip- ment Corpn., Visakhapatnam.	614	10950	839	46375	96	9600	..	..	..	..	..	..	..	..	1549	166925
15	Radio and Electricals Ltd., Madras	..	..	162	8100	100	17850	26	13000	..	..	..	..	..	..	288	38950
16	Indian Transformers Ltd., Alwaye	20	500	74	3300	..	..	..	..	..	..	..	..	..	..	94	3800
17	Pradip Lamp Works Ltd., Patna	69	1725	124	6200	51	5100	..	..	..	..	..	..	..	..	244	13025
18	Heavy Electricals Ltd., Bhopal	..	..	..	..	..	..	..	..	9	7250	4	9000	37	645400	50	661650
TOTAL		4827	103520	4371	233154	3190	456615	894	395803	475	404729	134	210200	213	1504600	14104	3308610
%			(3.1)		(7.0)		(13.8)		(12.0)		(12.2)		(6.4)		(45.5)		(100)

II—Statement showing production of transformers of individual Manufacturers during 1964

Sl. No.	Name of the firm	Up to 25 KVA			Above 25-75 KVA			Above 75-250 KVA			Above 250-500 KVA			Above 500-1000 KVA			Above 1000 to 2000 KVA			Above 2000 KVA			Total		
		Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA	Nos.	KVA
1	Kirloskar Electric Co. Ltd., Bangalore.	..	..	244	12,255	562	82,863	112	52,550	76	65,400	27	44,250	22	66,000	1,043	323,318								
2	Government Electric Factory, Bangalore.	502	10,730	262	13,775	348	46,325	52	23,450	75	61,000	9	11,750	..	..	1,248	167,030								
3	Hackbridge-Hewitt and Eason Ltd., Madras.	..	..	245	9,790	671	76,275	20	10,000	20	11,300	7	9,000	73	371,250	1,036	493,615								
4	Transformer & Switchgear Ltd., Madras.	83	4,650	239	15,125	..	..	2	1,000	14	14,000	12	21,000	20	76,000	370	131,775								
5	Radio and Electricals Ltd., Madras.	..	..	144	7,450	26	5,250	18	9,000	..	..	..	..	..	..	188	21,700								
6	Bajaj Electricals, Ltd., Bombay.	..	..	117	6,000	222	39,350	99	43,965	..	..	..	..	..	..	438	89,315								
7	National Electrical Industries Ltd., Bombay.	..	..	12	705	55	12,650	27	11,750	42	35,270	20	33,000	55	353,750	211	447,125								
8	Crompton Parkinson (Works) Pvt. Ltd., Bombay.	538	8,663	45	2,555	133	25,175	206	84,750	97	81,350	50	76,500	38	182,000	1,107	460,993								
9	Bharat Bijlee Ltd., Bombay	80	1,210	305	15,300	87	13,142	52	23,800	38	30,300	35	53,700	..	..	597	137,452								
10	Emco Transformers Pvt. Ltd., Bombay.	24	565	106	5,430	97	15,325	24	10,200	45	37,550	13	19,250	1	2,500	310	90,820								
11	Hindustan Electric Co. (Baroda Works) Ltd., Bombay.	223	5,575	23	1,150	59	6,200	19	9,500	9	6,750	2	2,500	..	..	335	31,675								
12	Associated Electrical Industries Mfg. Co. Pvt. Ltd., Calcutta.	..	..	..	..	24	4,800	37	12,900	9	7,400	18	45,000	3	15,000	91	85,100								
13	Electric Construction & Equipment Co. Ltd., Calcutta.	1,946	36,900	345	17,375	860	111,400	164	60,400	44	39,750	10	14,250	9	43,000	3,378	323,075								
14	Hindustan Electric Co. (Howrah Works) Ltd., Bombay.	391	9,735	36	1,800	62	10,350	54	25,350	36	29,500	..	..	..	..	579	76,735								

15	G. E. C. of India Mfg. Ltd., Calcutta.	1,640	30,595	581	32,750	392	58,650	97	41,600	62	54,000	30	47,250	22	68,000	2,824	332,845
16	Andhra Pradesh Electrical Equipment Corps., Visakhapatnam.	710	15,950	391	26,975	242	28,600	29	10,500	..	..	..	..	..	..	1372	82,025
17	Indian Transformers Ltd., Alwaye.	1	10	..	..	1	100	..	..	..	..	..	..	..	..	2	110
18	Pradip Lamp Works Ltd., Patna.	69	1,165	57	3,150	77	7,600	..	..	..	..	..	..	..	..	203	11,915
19	Heavy Electricals Ltd., Bhopal	..	..	..	..	..	..	..	..	3	2500	5	15,000	41	931,501	49	949,000
TOTAL		6,207	125,748	3,152	171,585	3,918	544,055	1,012	430,715	570	476,070	238	392,450	284	2,115,000	15,381	4,255,623
%			(3.0)		(4.0)		(12.8)		(10.1)		(11.2)		(9.2)		(49.7)		(100)

APPENDIX V

(Vide Paragraph 12.2)

A.—Statement showing imports of transformers during 1963 and 1964 as recorded in the Monthly Statistics of Foreign Trade of India

Transformers	1963		1964 (Jan.—March)	
	Nos.	Value (Rs.)	Nos.	Value (Rs.)
I	2	3	4	5
I. Upto 3.3 KV				
Upto 25 KVA	25	14,043	..	..
26 to 75 KVA	26	43,362	..	..
76 to 250 KVA	24	1,03,522	20	35,723
251 to 500 KVA	1	31,555	..	..
501 to 1000 KVA	..	..	..	..
1001 to 1500 KVA	..	..	..	..
1501 to 2500 KVA	..	..	..	..
Above 2500 KVA	4	8,24,571	..	..
TOTAL	80	10,17,053	20	35,723
II. 3.4 to 6.6 KV				
Upto 25 KVA	47	29,111	..	..
26 to 75 KVA	3	3,444	3	4,366
76 to 250 KVA	..	..	..	..
251 to 500 KVA	1	39,460	..	..
501 to 1000 KVA	2	58,037	..	..

1001 to 1500 KVA .	.	.	.	.	.	..	..	..	..
1501 to 2500 KVA .	.	.	.	.	.	..	..	..	..
Above 2500 KVA .	.	.	.	.	.	3	11,71,255	..	..
TOTAL	.	.	.	.	.	56	13,01,307	3	4,366

III. 6.7 to 11 KV

Upto 25 KVA	.	.	.	.	.	440	2,84,565	4	5,281
26 to 75 KVA	.	.	.	.	.	17	27,841	4	5,307
76 to 250 KVA	.	.	.	.	.	..	..	..	..
251 to 500 KVA	.	.	.	.	.	..	..	..	..
501 to 1000 KVA	.	.	.	.	.	5	2,17,675	2	50,353
1001 to 1500 KVA	.	.	.	.	.	3	1,97,043	..	..
1501 to 2500 KVA	.	.	.	.	.	..	..	..	..
Above 2500 KVA	.	.	.	.	.	..	..	..	..
TOTAL	.	.	.	.	.	465	7,27,124	10	60,941

IV. 22 KV

Upto 25 KVA	.	.	.	.	.	3	2,878	..	..
25 to 75 KVA	.	.	.	.	.	..	..	6	6,834
76 to 250 KVA	.	.	.	.	.	..	..	..	..
251 to 500 KVA	.	.	.	.	.	..	..	..	..
501 to 1000 KVA	.	.	.	.	.	..	..	..	..
1001 to 1500 KVA	.	.	.	.	.	..	..	..	..
1501 to 2500 KVA	.	.	.	.	.	..	..	..	..
Above 2500 KVA	.	.	.	.	.	3	12,52,321	1	1,50,000
TOTAL	.	.	.	.	.	6	12,55,199	7	1,56,834

APPENDIX V-A.—(contd.)

1	2	3	4	5
V. 33 KV to 37.5 KV				
Upto 25 KVA	..	..	..	..
26 to 75 KVA	..	..	..	..
76 to 250 KVA	1	1,416	..	..
251 to 500 KVA	8	2,09,671	..	..
501 to 1000 KVA	..	..	..	..
1001 to 1500 KVA	..	..	..	..
1501 to 2500 KVA	22	6,60,200	..	..
Above 2500 KVA	1	5,67,514	..	..
Total	32	14,38,801	..	..
VI. Above 37.5 KV				
Upto 25 KVA	..	..	..	..
26 to 75 KVA	..	..	..	..
76 to 250 KVA	26	1,35,549	..	..
251 to 500 KVA	..	..	2	25,547
501 to 1000 KVA	..	..	..	..
1001 to 1500 KVA	10	4,45,087	..	..
1501 to 2500 KVA	1	49,808	..	..
Above 2500 KVA	25	86,73,390	14	30,17,101
Total	62	93,03,834	16	30,42,648

VII. Transformers—Lighting, smaller than 1 KVA	46	25,809	..	
VIII. Transformers NES	2,037	1,64,37,480	836	34,50,511
<hr/>				
TOTAL OF I TO VI	701	1,50,43,318	56	33,00,512
<hr/>				
GRAND TOTAL OF I TO VIII	2,784	3,15,06,607	892	67,51,023
<hr/>				

APPENDIX V-A—(contd.)

Transformers	April-December 1964	
	Nos.	Value (Rs.)
I. Upto 37.5 KV		
Upto 3000 KVA	1284	4073189
3001—5000	4	190120
5001—10000	2	850600
Above 10,000	18	2678225
TOTAL	1308	7792134
II. Upto 67 to 132 KV		
Above 10,000	9	2308465
TOTAL	9	2308465
III. Above 132 KV		
3001—500	2	435097
Above 10,000	31	15231992
TOTAL	33	15667089
TOTAL OF I, II AND III ABOVE	1350	25767688
TOTAL FOR JAN.-MARCH, 1964	892	6751023
GRAND TOTAL FOR THE ENTIRE YEAR 1964	2242	32518711

B.—Statement showing imports of Power and Distribution Transformers (protected categories) into India during the years 1963 and 1964 as reported to the Commission by the D.G.C.I. and S.

Transformers	1963				1964		
	No.	KVA	Value (Rs.)	No.	KVA	Value (Rs.)	
I	2	3	4	5	6	7	
Upto 37.5 KV							
(i) Upto 3,000 KVA	26	10,040*	2,51,645	23	7,648	7,32,523	
(ii) Above 3,000 KVA to 5,000 KVA				..	..	..
(iii) Above 5,000 KVA to 10,000 KVA	1	6,000	2,49,996	2	20,000	3,01,146	
(iv) Above 10,000 KVA	75	8,25,000	4,439	6	151,000	20,70,595	
	102	8,41,040	5,06,080	31	178,648	31,04,264	
Above 37.5 KV to 66 KV							
(i) Upto 3,000 KVA	5	5,000	2,16,046	..	..	..
(ii) Above 3,000 KVA to 5,000 KVA	..	..	..	..	..	..
(iii) Above 5,000 KVA to 10,000 KVA	..	..	..	..	..	..
(iv) Above 10,000 KVA	..	..	..	7	137,500	23,52,186
	5	5,000	2,16,046	7	137,500	23,52,186	

APPENDIX V-B—(contd.)

	2	3	4	5	6	7
<i>Above 66 KV to 132 KV</i>						
(i) Upto 3,000 KVA	3	1,000*	66,076	..	..	..
(ii) Above 3,000 KVA to 5,000 KVA . . . . .	..	..	..	..	..	..
(iii) Above 5,000 KVA to 10,000 KVA	15	50,000*	6,81,754	1	7,500	2,27,900
(iv) Above 10,000 KVA	1	10,000	2,76,755	1	20,000	3,25,498
	19	61,000	10,24,585	2	27,500	5,53,398
<i>Above 132 KV</i>						
(i) Upto 3,000 KVA . . . . .	..	..	..	..	..	..
(ii) Above 3,000 KVA to 5,000 KVA . . . . .	..	..	..	..	..	..
(iii) Above 5,000 KVA to 10,000 KVA . . . . .	..	..	..	100	13,200*	1,10,836
(iv) Above 10,000 KVA	41	36,000*	3,13,402	3	100,000	15,88,352
	41	36,000	3,13,402	103	113,200	16,99,188
<i>Upto 220 KV on the H.T. side</i>						
(primary voltage being over 250)						
Upto 50,000 KVA . . . . .	..	..	..	1	below 50,000	3,314
GRAND TOTAL	167	943,040	20,60,113	144	506,848	77,12,350

*Figures deficient.